Final

F-35 Force Development Evaluation and Weapons School Beddown

Environmental Impact Statement

United States Air Force
Air Combat Command

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Report Documentation Page

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14. ABSTRACT

This Final EIS, prepared in accordance with the National Environmental Policy Act, responds to public and agency review and comments on the Draft EIS. The F-35 Joint Strike Fighter (JSF) is being developed to replace and supplement Air Force legacy fighter aircraft such as the F-16 Fighting Falcon and A-10 Thunderbolt II. Federal law and United States Air Force (Air Force) policy require implementation of an FDE program and WS training of all new aircraft. To meet these requirements for the F-35, the Air Force proposes to base 12 F-35 aircraft at Nellis AFB for the FDE program and an additional 24 F-35 for WS training. As a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first F-35 would arrive in 2012 and the last in 2020. This proposal involves construction, demolition, or modification of base facilities and implementation of flight activities for the FDE program and WS within the NTTR. The Draft EIS analyzed the potential environmental consequences of the proposed beddown at Nellis AFB and the no-action alternative. Under the no-action alternative, the FDE program and WS would not be implemented at Nellis AFB. None of the associated construction or personnel changes would occur. The findings indicate that the proposed F-35 beddown would not adversely impact airspace and aircraft operations, safety, recreation, socioeconomics, environmental justice and protection of children, soils, water, biological resources, cultural resources, or hazardous materials and waste. Emissions of CO and NOx would exceed de minimus, but these would not result in adverse impacts or affect Clark County?s attainment goals based on State Implementation Plans for the pollutants. The proposed beddown would increase noise levels around Nellis AFB based on analyses using currently available data on the F-35. Under the proposed action, there would be an overall increase in the number of people affected and the land area exposed to DNL noise levels of 65 dB and greater. Currently, noise levels of 65 dB DNL and greater affect a large number of minority populations and to a lesser extent low-income populations and that trend would continue under the proposed action. These populations live in areas already zoned for land uses above 65 dB DNL but Nellis AFB would continue to employ noise abatement procedures to reduce noise effects in the surrounding communities. The Air Force would also continue to assist local officials who seek to establish or modify noise attenuation measures for residences. For NTTR, subsonic noise levels would increase a maximum of 3 dB. Sonic booms would increase by no more than 4 booms per month in one military operations areas and by no more than 2 booms per month in restricted areas. Supersonic activity would increase noise in some areas under the NTTR airspace authorized for supersonic flight by no more than 2 CDNL. There are no

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RECORD OF DECISION
FOR THE
F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL BEDDOWN
NELLIS AFB, NEVADA

This document records the United States Air Force (Air Force) decision with regard to the F-35 Force Development Evaluation (FDE) and Weapons School (WS) Beddown at Nellis AFB in Nevada. This Record of Decision is based on the information, analysis, and public and agency comments presented in the Final Environmental Impact Statement (FEIS), as well as other factors.

This Record of Decision has been drafted in accordance with the regulations implementing the National Environmental Policy Act (NEPA), specifically Title 40 Code of Federal Regulations (CFR), Section 1505.2, *Record of decision in cases requiring environmental impact statements* (40 CFR § 1505.2). Specifically, this ROD:

- States the Air Force's Decision (page 11);
- Identifies all alternatives considered by the Air Force in reaching the decision (pages 6-7) and specifies the preferred and environmentally preferred alternative (page 7);
- Identifies and discusses the environmental consequences of the proposed action (pages 6-9); and
- Summarizes mitigation measures and programs/processes in place to address issues and assist in reducing the potential environmental impacts associated with the F-35 beddown (pages 9-11).

BACKGROUND

Based on decisions made by Congress, the Air Force will receive F-35 aircraft to supplement and replace legacy fighter aircraft like the F-16. The Air Force will receive the F-35A model designed for conventional takeoffs and landings on runways. Other variants have been designed for the U.S. Navy and Marine Corps.

Implementing the FDE program and WS represent essential elements in fielding the F-35 for combat. As such, the Air Force intends to implement this beddown as soon as feasible. The Air Force plans to begin the F-35 FDE program by fiscal year 2012 (FY12). The FDE program lasts as long as the aircraft remains in the Air Force inventory, repeatedly testing and evaluating the aircraft and its systems to ensure continued fulfillment of operational requirements. FDE also explores the use of new flight techniques and tactics for aircraft performance, supporting pilot development and training programs. By testing

capabilities of an aircraft in tactical situations, including air-to-ground, air-to-air, and electronic combat operations, FDE provides unique input on tactics to the WS and operational units.

The WS represents an essential activity also performed throughout the life of the aircraft. As established in AFI 11-415, the WS conducts graduate-level instructor courses in weapons and tactics employment. The WS offers academic courses and flight training on specific aircraft to qualified instructor pilots. Upon completion of WS courses, which include two weeks of combat training exercises, graduate officers return to their home units to provide advanced instruction to unit pilots on employing the aircraft for its mission. As currently planned under the Proposed Action, F-35 WS graduates from Nellis AFB would return to operational squadrons in FY17.

The ultimate goal of the F-35 development and deployment process is to provide Air Force operational units with a proven, tested aircraft, as well as tactics and operational guidance to meet mission requirements. The purpose, therefore, of the Proposed Action is to implement the F-35 FDE program and WS. The F-35 development and manufacturing process has been initiated and evaluation of the aircraft is currently taking place. The goal of the Air Force is to field the most up-to-date aircraft with the most highly trained pilots through the lifecycle of the weapons system. This is achieved through the FDE program and the WS for the aircraft and pilots, respectively.

For the Air Force, Air Combat Command (ACC) is responsible for implementing FDE and WS programs. These programs are best performed at a location that has infrastructure to support the full spectrum of testing and training activities. Nellis AFB is the location of the Air Force's only fighter WS. Nellis AFB, and its associated Nevada Test and Training Range (NTTR) and airspace, represent the only ACC Major Range and Test Facility Base (MRTFB) that meets the unique requirements for the F-35 FDE program and WS. No other base, or combination of bases, offers the specific physical or organizational infrastructure necessary to support the unique requirements of the F-35 FDE and WS programs. Nellis AFB and its ranges fulfill the F-35 testing and training program needs. Essentially, the F-35 is considered additive to the on-going Air Force fighter FDE and WS programs at Nellis AFB.

PUBLIC INVOLVEMENT

The public involvement process and Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) and agency consultation accomplished by the Air Force are discussed in the Final EIS (Section 7.0 and Appendix A). The major elements of public involvement are:

- The public involvement process began with the publication of the Notice of Intent to prepare an EIS in the *Federal Register* on August 23, 2004. After public notification in newspapers and public service announcements on radio stations, five scoping meetings were held September 13 through September 17, 2004, at the following Nevada locations: Carson City, Alamo, Pioche,

Pahrump, and Las Vegas. A total of 40 people attended the meetings and provided comments. By the end of the scoping period, October 1, 2004, nine comments and one agency letter were received. All relevant comments were considered in the development of the Draft EIS.

- The Notice of Availability of the Draft EIS was published in the *Federal Register* on April 4, 2008, beginning the 45-day public review period. Public hearings were held April 22 through April 24, 2008, in these Nevada locations: Las Vegas, Caliente, and Alamo. The closing of the comment period was extended from May 19, 2008 to May 22, 2008, by request of the U.S. Environmental Protection Agency. Issuance of a Notice of The Availability of this document was announced in the Federal Register on May 13, 2011 (Vol. 76, Number 93) [Notices] [Page 28029]. All relevant comments received during the public review and comment period were reviewed by the Air Force and considered in the preparation of the Final EIS. The Nevada public hearing locations were selected for the following reasons: interest in the proposal remained high in Las Vegas and Alamo, and both form part of the affected area; Alamo and Caliente, as indicated by findings in the analysis, were representative communities central under the MOA airspace – both communities revealed interest in the proposal; Pahrump lies outside the affected airspace and showed low levels of interest, and Pioche reflected negligible public interest as well. Seven people attended the three hearings. While none of the attendees provided oral or written comments, three of the attendees informally expressed opposition to existing and proposed aircraft overflights, suggesting a decrease in home values and quality of life.

- The Air Force received comment letters from three private individuals and from the following Nevada offices and federal agencies: Department of Comprehensive Planning, Department of Air Quality Management, Nevada State Historic Preservation Office, City of North Las Vegas, U.S. Department of the Interior, and U.S. Environmental Protection Agency (USEPA). Comments were also received from the Consolidated Group of Tribes and Organizations' Document Review Committee.

The final EIS reflected comments received during the public comment period, factual corrections, and improvements and/or modifications to the analyses presented in the Draft EIS. While the final EIS was, in large part, the same as the draft EIS, modifications included updated proposed construction projects and start dates, as well as a revised timeframe for the F-35 beddown. Also modified in the Final EIS was a re-evaluation of projected noise impacts. Since the 2008 publication of the Draft EIS, characterization of the noise generated by the F-35 has been refined and several supplemental noise analyses have been developed. The supplemental noise impact analyses now include speech interference, sleep disturbance, and potential hearing loss. Due to the new noise data, revised projected noise contour bands were also produced and potential impacts presented in the relevant resource sections. Air quality evaluations were also updated to reflect changes in proposed construction projects and start dates, the F-35 revised beddown phasing, and the outcome of the Clean Air Act General Conformity Determination. None of the

modifications made to the Final EIS resulted in substantive changes to the Proposed Action and the conclusions presented in terms of environmental consequences and impacts remain consistent with those presented in the Draft EIS.

AGENCY COORDINATION AND CONSULTATION

Interagency and Intergovernmental Coordination for Environmental Planning: NEPA and the Council on Environmental Quality (CEQ) regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the IICEP process, concerned federal, state, and local agencies (such as the USEPA, US Fish and Wildlife Service, Bureau of Land Management, Nevada Division of Environmental Protection, Nevada State Historic Preservation Officer, and Clark County Department of Air Quality and Environmental Management (DAQEM)) were notified and allowed sufficient time to evaluate potential environmental impacts of a Proposed Action.

General Conformity Determination: The Air Force made positive conformity determinations for the emissions of Nitrogen Oxide (NOx), a precursor of ground-level Ozone, and Carbon Monoxide (CO). For NOx, the Clark County DAQEM has agreed in writing to include Air Force F-35 emissions in any State Implementation Plan (SIP) submittal to the USEPA (October 20, 2009). DAQEM and the State of Nevada have issued a written commitment to include the NOx emissions in the maintenance implementation plan that DAQEM and the State intend to submit pursuant to the provisions of 42 USC § 7505a in connection with a redesignation to attainment request under 42 USC § 7407(d) (November 16, 2009). Based on this commitment, the Air Force made a positive conformity determination with respect to NOx per the provisions of 40 CFR 93.158(a)(5)(i)(B). With respect to CO, Clark County DAQEM has informed the Air Force that it included emissions from this F-35 project in its area-wide modeling that has already been submitted to USEPA as part of DAQEM's Maintenance Plan for CO. DAQEM observed that the F-35 project's emissions are very small in proportion to the total CO emissions inventory in the Las Vegas Valley, and concluded that no additional local air quality modeling or hot-spot analysis is necessary. Therefore, a positive conformity determination for CO may be made on this basis in accordance with 40 CFR Part 93.158(a)(4)(ii).

Government-to-Government Consultation: As part of the NEPA process, 37 members of the Nellis AFB Native American Program (NAP) who represent 19 tribes with historical ties to the land in the vicinity of NTTR were notified at the initiation of the project as part of an ongoing government-to-government consultation between Nellis AFB and these tribes. The Nellis AFB NAP Manager coordinated consultation between the Air Force and the tribes. These 19 tribes have aligned themselves together to form the Consolidated Group of Tribes and Organizations (CGTO). This group is formed by officially appointed representatives who are responsible for representing their respective tribal concerns and perspectives. The CGTO elects members to a Document Review Committee (DRC) who review numerous types of environmental documents and cultural resources reports, coordinate with tribal

members, and provide comments to represent the members of the Nellis AFB NAP. The DRC was involved in the review of the Draft EIS and provided their comments to the Air Force.

ALTERNATIVES ANALYZED IN THE EIS

The EIS analyzed two alternatives, the Proposed Action and No-Action. As noted above, only Nellis AFB and its associated range met the requirements for this beddown.

Proposed Action

The Proposed Action involves the following.

- Base 36 F-35 aircraft at Nellis AFB with 12 aircraft for the FDE program and an additional 24 for WS training; as a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first aircraft would arrive in 2012 and the last in 2020.
- Implement the F-35 FDE program at the base in 2012 and implement the WS in 2015.
- Construct, demolish, or modify a variety of base facilities to support the F-35 programs, particularly along the flightline.
- Conduct an additional 17,280 annual airfield operations at Nellis AFB by 2020, and an additional 51,840 annual sortie-operations in NTTR.
- Practice ordnance delivery on approved targets and release of flares in approved airspace.

No-Action Alternative

Under the no-action alternative, no F-35 FDE program and WS beddown would occur at Nellis AFB and no on-base construction would be implemented or personnel increases occur. In addition, the F-35 FDE program and WS would not use NTTR.

Alternatives Considered But Not Carried Forward

Several alternatives were considered but not carried forward for detailed analysis; none of these alternatives met beddown requirements for the FDE and WS, nor did they fulfill the need for the Proposed Action. Establishing the F-35 FDE program or WS at a base other than Nellis AFB or at a range other than NTTR might be possible, but it would not represent a reasonable alternative. Other bases would need to make changes to their infrastructure, organization, existing programs, and probably, reconfigure/create new airspace and ranges in order to meet the specific requirements of an F-35 FDE program and WS. Such changes would conflict with the overall basing consideration regarding minimizing change by employing existing assets. To provide the integrated battlespace environment and level of training exercises important to the FDE program and WS, the Air Force would need to make wholesale changes to the ranges and the exercises held there. Basing the F-35 FDE program and WS at a

base other than Nellis AFB would require changes to that base, its organization, and its associated ranges and airspace. This would:

- Require additional time to establish the FDE program and WS, further delaying the entire F-35 program and potentially diminishing national defense capabilities;
- Substantially increase the costs of implementing the F-35 program beyond that allocated by Congress and approved by the President; and
- Likely result in more extensive actions that could have effects on the environment greater than those potentially occurring from the Proposed Action.

No location or combination of locations other than Nellis AFB would meet the specific requirements for basing the F-35 FDE program and WS. No reasonable action alternative to Nellis AFB exists, because none would fulfill the purpose and need for the proposal.

Preferred and Environmentally Preferred Alternatives

CEQ regulations require the proponent to identify the preferred alternative. The Air Force has defined the Proposed Action as the preferred alternative. CEQ regulations also require that an environmentally preferable alternative be identified. The no-action alternative would not substantially impact the environment in the short-term, and for NEPA purposes, it would be the environmentally preferable alternative in that it has the least potential for adverse environmental consequences.

ENVIRONMENTAL CONSEQUENCES

The findings in this EIS indicate that the proposed F-35 beddown would result in either negligible effects or would not change current environmental conditions at Nellis AFB or in the NTTR for airspace and aircraft operations, safety, recreation, soils, water, biological resources, cultural resources, or hazardous materials and waste. Each of the resources potentially affected by the proposal is presented below; resources where current environmental conditions would not change are not included in the discussion.

Airspace and Aircraft Operations: In terms of airspace and aircraft operations, there would be a total increase of 20 percent to airfield operations; however, no change to airfield airspace structure or operational procedures would occur. No impacts to civil and commercial aviation airspace and no changes in departure and arrival routes would be required to accommodate the F-35. In the NTTR, the F-35s would fly approximately 51,840 annual sortie-operations representing 17 to 26 percent of the 200,000 to 300,000 sortie-operations that now occur annually. This use would negligibly affect environmental conditions in the NTTR. During air combat maneuvering, the F-35 will fly supersonic within NTTR airspace at altitudes authorized for supersonic flight; most of these operations would occur above 25,000 feet mean sea level. The F-35 would deliver ordnance only on existing, previously disturbed targets. No new areas would be affected. The F-35 would also use flares as defensive countermeasures, but only in

areas already subject to and approved for such use. Overall, the activities proposed for the F-35 at the NTTR would be consistent with current activities and would not significantly affect the environment.

Safety: Additional munitions facilities and expansion of the live ordnance loading area on base would be constructed to support an increase in airfield operations; this would enhance safety. No other changes in safety at Nellis AFB or NTTR are anticipated. Current operations and maintenance procedures would remain in place, fire and crash response would not be affected, and munitions use and handling procedures would remain consistent with existing rules and regulations. No anticipated increase in the rate of bird/wildlife-aircraft strike hazards or aircraft mishaps above baseline levels would occur.

The proposed personnel increase would not have an adverse impact on local or regional demand on recreational/community services, utilities, or housing. Soils, water, biological, and cultural resources would be negligibly affected and would not introduce any adverse impacts to the environment. Hazardous materials and waste management procedures already established for other similar aircraft would continue to be followed. If new materials or wastes are generated, then Air Force procedures would be established to contain and properly dispose of them.

Air Quality: Emissions of air pollutants into the area around Nellis AFB would increase but would not significantly impact local air quality. Potential sources of emissions at Nellis AFB would include aircraft operations, facility construction, maintenance activities, refueling, as well as private and government vehicle travel. *De minimis* levels would be exceeded for carbon monoxide (CO) and nitrogen oxide (NO_x); however, Clark County's DAQEM has affirmed that they will include the added NO_x emissions into their Ozone SIP revision and that the CO exceedances have already been accounted for in the Clark County CO SIP. These exceedances, therefore, would not preclude the county from attaining and maintaining National Ambient Air Quality Standards. While greenhouse gas (GHG) emissions would also increase with implementation of the Proposed Action, they would not be expected to produce a significant environmental effect on global GHG concentrations.

Noise: The Proposed Action would generate a 42 percent increase (an additional 7,562 acres) in areas exposed to a day-night average sound level (DNL) of 65 decibels (dB) and greater by the year 2020. Twenty representative locations would experience increases of between 1 and 3.4 dB DNL in noise levels; populations in on-base dormitories would continue to be exposed to potential hearing loss (PHL) in the 80 to 85 dB DNL contour bands; daytime speech interference events when windows are closed would occur 1 to 3 more times an hour; when windows are open, events would increase between 2 and 3 more times per hour; there would be an increase in probability of sleep disturbance between 1 and 7 percent with windows closed and 1 and 10 percent with windows open; and noise complaints and annoyance levels in the Nellis AFB vicinity may increase. However, while there would be noticeable increases to the population exposed to noise levels greater than 65 dB DNL or greater, no long-term impacts to hearing or health are anticipated.

Within NTTR, subsonic noise levels would continue to range from less than 45 to 65 dB DNL for the 200,000 and 300,000 sortie scenarios. Supersonic noise levels would continue to range from less than 45 to 57 dB CDNL (or the day-night sound level computed for areas subject to sonic booms) under the 200,000 and 300,000 scenarios. All other supersonic-authorized airspace would be subject to increases of one dB CDNL or less and less than one sonic boom per month.

Land Use: Areas affected by noise in the 65 dB DNL contour band and greater would decrease when compared to the land use contours established by Clark County Department of Planning contours. In addition, when compared to Clark County Department of Planning contours, all land use categories affected by noise levels 65 dB DNL and greater would experience a decrease under the proposed action. The only exceptions are land uses in the commercial (experiencing less than a 1 percent increase) and military (increases by about 15 percent) categories. The greatest decrease is seen in the residential acreage where there would be 1,280 fewer acres affected by noise levels greater than 65 dB DNL and for public lands that would reduce by 1,046 acres, or 38 and 31 percent, respectively.

Environmental Justice and Protection of Children: About 40,703 people would be affected by noise levels within 65 dB DNL or greater contour bands, an increase of 574 over baseline levels. Of this total, 23,469 represent minority populations, an increase of 203 from baseline conditions; low-income populations would increase from 5,406 to 5,460 (or by 54 individuals). While there would be increases in the number of minority and low-income populations exposed to noise levels of 65 dB DNL and greater; these increases would not introduce significant impacts to these populations. Schools would continue to be exposed to noise levels of 65 dB DNL or greater; however, safety and health risks to children would not increase.

Socioeconomics: In terms of socioeconomic impacts, no significant negative effects are anticipated. There would be a net increase of 412 active duty personnel at Nellis AFB by 2020 (a 3.4 percent increase over 2006); this would represent nearly $28.3 million in additional payroll disbursements.

Cumulative Impacts: The F-35 beddown at Nellis AFB, when considered cumulatively with past, present, and/or future actions, would not have an adverse and/or significant impact to noise; safety; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; biological resources; or hazardous materials and waste. The analysis indicates a potential impact on airspace and aircraft operations; air quality; soils and water; and cultural resources; however, when considered cumulatively with other actions, the impacts would not be significant.

MITIGATION MEASURES AND MANAGEMENT ACTIONS

Reduction of the potential for environmental impacts represents an important part of NEPA.

CEQ regulations (at 40 CFR §1508.20) define mitigation as follows:

1. **Avoiding** the impact altogether by not taking a certain action or parts of an action.
2. **Minimizing** impacts by limiting the degree or magnitude of the action, and its implementation.
3. **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
4. **Reducing or eliminating** the impact over time by preservation and maintenance operations during the life of the action.
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

Nellis AFB conducts ongoing efforts designed to achieve reductions in the effect the base has on the community and to work with groups or members of the community to address issues. All of these efforts, including those highlighted below and other operational mitigations which are part of the EIS, would continue to apply following the F-35 beddown. By continuing these efforts, Nellis AFB would reduce the potential impacts associated with the F-35 beddown.

Fugitive Dust Controls: Nellis AFB will mitigate fugitive dust emissions through the Western Regional Air Partnership (WRAP) fugitive dust handbook (WRAP 2004) guidelines. The WRAP guidelines, which were developed for use in western states, assume standard dust mitigation best practices activities of fifty percent from wetting.

Noise Abatement Program: Nellis AFB's noise abatement program focuses on reducing noise over residential areas surrounding the base. By employing this program, Nellis AFB will continue to reduce noise effects on the general populations, as well as affected minority and low-income populations. Procedures used in the Noise Abatement Program include:

- Restricting nighttime flying activities and routes to have the least effect on populated areas;
- Modifying approach and departure procedures to increase altitude at various points along the arrival and departure paths;
- Using northbound departures to the extent possible during evening hours (10 p.m. until 8 a.m.) and for all aircraft carrying live ordnance;
- Minimizing unrestricted afterburner take-offs on weekends or holidays, or before 10 a.m. on weekdays; and
- Avoiding practice approaches before 9 a.m. daily.

The Air Force also will continue to evaluate the noise generated by the F-35 at Nellis AFB. Should further feasible noise abatement procedures be identified at the time of the F-35 beddown, the Air Force would assess and potentially implement them.

Air Installation Compatible Use Zone Program: The Air Installation Compatibility Use Zone Program (AICUZ) is an ongoing program for all Air Force airfields. It is designed to assist the adjacent community by recommending land use planning that ensures safe aircraft operations and minimizes noise impacts to the community. Elements of the AICUZ program include:

- Maintaining a cooperative, open dialogue between the base and the community for land use planning;
- Offering assistance to the community in planning for changes in aircraft operations and noise; and
- Developing noise contours around the base that can be used by the community for zoning ordinances.

Nellis AFB has conducted the AICUZ program for almost three decades. Nellis AFB continues to work with the Clark County's Department of Comprehensive Planning to recommend concepts for land use plans and zoning ordinances. Clark County has incorporated the AICUZ recommendations as an integral part of their comprehensive planning process in order to reduce the potential for conflicts between aircraft operations at Nellis AFB and development in the nearby community.

Community Outreach Program: Nellis AFB has been a part of the Las Vegas metropolitan area community for over 60 years. Like any major institution in a community, being a good neighbor is a top priority. At Nellis AFB, this has resulted in a public outreach program through such events as air shows and restoration advisory board meetings. To augment specific outreach efforts, Nellis AFB has expanded its community interaction program to provide more emphasis on the minority and low-income populations around the base. This effort aids these segments of the community in understanding the function and importance of Nellis AFB, as well as providing a focused opportunity for minority and low-income populations to work with the base on issues concerning them. NTTR range managers meet with communities and land management offices located under the training airspace to provide information and answer questions regarding noise and military training operations in the airspace above their communities and recreation areas.

Native American Program (NAP): Nellis AFB has a comprehensive NAP and conducts substantial government-to-government relations with Native Americans affected by activities at the base and in the NTTR. This ongoing interaction program addressed the F-35 proposal and EIS through:

- Direct notification of the initiation of the EIS process and invitation to scoping meetings to 37 members of the Nellis AFB NAP who represent 19 tribes with historic ties to the land in the NTTR vicinity;
- Direct distribution of copies of the draft EIS to members of the Consolidated Group of Tribes and Organizations' Document Review Committee to ensure their awareness of the proposal and its potential effects, and to receive comments from them. AF responses to CGTO comments were incorporated and responded to in the FEIS.

Nellis AFB's NAP and associated government-to-government relations would continue should the F-35 beddown occur. Any future issues from the Native Americans regarding the F-35 would be addressed through this program.

The EIS used public involvement to identify impacts and assess the environmental consequences associated with the F-35 FDE and WS beddown at Nellis AFB. Measures currently implemented (and described above) to minimize the noise impacts around Nellis AFB will be applied to F-35 operations. The Air Force is taking all practicable means to avoid or minimize harm from the Proposed Action. Should additional prudent measures become available, the Air Force will implement them to the maximum extent possible, commensurate with cost, mission capability, and flight safety. The Air Force is committed to being a good neighbor and will continue to work with the Clark County's Comprehensive Planning Commission to evaluate land use recommendations around Nellis AFB. This coordination will aid in the reduction of noise impacts on the surrounding community.

DECISION

After considering the potential environmental consequences of the Proposed Action and no-action alternative, as well as other factors relative to national defense, including current military operational needs, the Air Force has decided to select the Proposed Action for F-35 FDE and WS beddown at Nellis AFB. The Preferred Alternative includes all practicable means to avoid, minimize, or mitigate environmental harm.

Kathleen I. Ferguson — 24 June 11

Kathleen I. Ferguson, P.E.
Deputy Assistant Secretary of the Air Force
(Installations)

Date

Final

F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement

United States Air Force
Air Combat Command

May 2011

F-35 FORCE DEVELOPMENT EVALUATION (FDE) AND WEAPONS SCHOOL (WS) BEDDOWN FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)

Responsible Agency: United States Air Force, Air Combat Command

Proposed Action: The Air Force proposes to base 36 F-35 fighter aircraft at Nellis Air Force Base (AFB), Nevada between 2012 and 2020. The aircraft would be assigned to the Force Development Evaluation (FDE) program and Weapons School (WS) at Nellis AFB. Flight activities would occur at Nellis AFB and Nevada Test and Training Range (NTTR). The F-35 beddown would also require construction of new facilities, and alteration and demolition of existing facilities at Nellis AFB.

Public distribution of the document took place March 31, 2008. The public review period, which included three public hearings, began April 4, 2008 when the Notice of Availability of the Draft EIS was published in the *Federal Register*. The public review period concluded May 22, 2008.

Inquiries regarding this Air Force proposal should be directed to:

HQ ACC/A7PS
129 Andrews St., Ste 327
Langley AFB, VA 23665-2769
ATTN: Mr. Nick Germanos

In addition, the document can be viewed on and downloaded from the World Wide Web at www.accplanning.org and www.nellis.af.mil/library/environment.asp.

Designation: Final Environmental Impact Statement

Abstract: This Final EIS, prepared in accordance with the National Environmental Policy Act, responds to public and agency review and comments on the Draft EIS. The F-35 Joint Strike Fighter (JSF) is being developed to replace and supplement Air Force legacy fighter aircraft such as the F-16 Fighting Falcon and A-10 Thunderbolt II. Federal law and United States Air Force (Air Force) policy require implementation of an FDE program and WS training of all new aircraft. To meet these requirements for the F-35, the Air Force proposes to base 12 F-35 aircraft at Nellis AFB for the FDE program and an additional 24 F-35 for WS training. As a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first F-35 would arrive in 2012 and the last in 2020. This proposal involves construction, demolition, or modification of base facilities and implementation of flight activities for the FDE program and WS within the NTTR. The Draft EIS analyzed the potential environmental consequences of the proposed beddown at Nellis AFB and the no-action alternative. Under the no-action alternative, the FDE program and WS would not be implemented at Nellis AFB. None of the associated construction or personnel changes would occur. The findings indicate that the proposed F-35 beddown would not adversely impact airspace and aircraft operations, safety, recreation, socioeconomics, environmental justice and protection of children, soils, water, biological resources, cultural resources, or hazardous materials and waste. Emissions of CO and NO_x would exceed *de minimus*, but these would not result in adverse impacts or affect Clark County's attainment goals based on State Implementation Plans for the pollutants. The proposed beddown would increase noise levels around Nellis AFB based on analyses using currently available data on the F-35. Under the proposed action, there would be an overall increase in the number of people affected and the land area exposed to DNL noise levels of 65 dB and greater. Currently, noise levels of 65 dB DNL and greater affect a large number of minority populations and to a lesser extent low-income populations and that trend would continue under the proposed action. These populations live in areas already zoned for land uses above 65 dB DNL but Nellis AFB would continue to employ noise abatement procedures to reduce noise effects in the surrounding communities. The Air Force would also continue to assist local officials who seek to establish or modify noise attenuation measures for residences. For NTTR, subsonic noise levels would increase a maximum of 3 dB. Sonic booms would increase by no more than 4 booms per month in one military operations areas and by no more than 2 booms per month in restricted areas. Supersonic activity would increase noise in some areas under the NTTR airspace authorized for supersonic flight by no more than 2 CDNL. There are no significant cumulative impacts from the interaction of the F-35 beddown and other past, present, and reasonably foreseeable actions.

LIST OF ACRONYMS AND ABBREVIATIONS

ABW	Air Base Wing
ACAM	Air Force Conformity Applicability Model
ACC	Air Combat Command
ACEC	Area of Critical Environmental Concern
ACM	Asbestos-Containing Material
ACMI	Air Combat Maneuvering Instrumentation
ABW	Air Base Wing
AFB	Air Force Base
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
afy	Acre Feet Per Year
AGE	Aerospace Ground Equipment
AGL	Above Ground Level
AGM	Air-to-Ground Missile
AICUZ	Air Installation Compatible Use Zone
AMU	Aircraft Maintenance Unit
APZ	Accident Potential Zone
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AWACS	Airborne Warning and Control System
BAQ	Bureau of Air Quality
BART	Best Available Retrofit Technology
BASH	Bird/Wildlife-Aircraft Strike Hazard
BLM	Bureau of Land Management
BO	Biological Opinion
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CCSD	Clark County School District
CCWRD	Clark County Water Reclamation District
CDNL	C-Weighted Day-Night Average Sound Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGTO	Consolidated Group of Tribes and Organizations
CO	Carbon Monoxide
CTOL	Conventional Take-off and Landing
CWA	Clean Water Act
CZ	Clear Zone
DAQEM	Department of Air Quality and Environmental Management
dB	Decibel
DERP	Defense Environmental Restoration Program
DNL	Day-Night Average Sound Level
DNWR	Desert National Wildlife Range
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
DRC	Document Review Committee
DRMO	Defense Reutilization and Marketing Office
DWMA	Desert Wildlife Management Area
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EMI	Electromagnetic Interference
EO	Executive Order
EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDE	Force Development Evaluation
FLPMA	Federal Land Policy and Management Act
FY	Fiscal Year
GHG	Greenhouse Gas
gpd	Gallons Per Day
GPS	Global Positioning System
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HMA	Herd Management Area
HTTC	High Technology Training Complex
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IOC	Initial Operational Capability
IR	Instrument Flight Rules
IRP	Installation Restoration Program
JAST	Joint Advance Strike Technology
JDAM	Joint Direct Attack Munitions
JSF	Joint Strike Fighter
Km	Kilometer

kV	Kilovolt
L	Sound Level
LBP	Lead-Based Paint
L_{dnmr}	Onset Rate-Adjusted Monthly Day-Night Average Sound Level
L_{max}	Maximum Sound Level
L/O	Low Observables
LOLA	Live Ordnance Loading Area
MAILS	Multiple Aircraft Instantaneous Line Source
MLWA	Military Land Withdrawal Act
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain
mm	Millimeter
MRTFB	Major Range and Test Facility Base
MSA	Munitions Storage Area
MSL	Mean Sea Level
MTR	Military Training Route
NA	Number of Events Above
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NACTS	Nellis Air Combat Tracking System
NAP	Native American Program
National Register	National Register of Historic Places
NDOT	Nevada Department of Transportation
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Pollutants
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
nm	Nautical Mile
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NOI	Notice of Intent
NOTAM	Notice to Airmen
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
NV	Nevada
NWR	National Wildlife Refuge
O_3	Ozone
OSHA	Occupational Safety and Health Act
OT&E	Operational Test and Evaluation
Pb	Lead
PCBs	Polychlorinated Biphenyls
PHL	Potential Hearing Loss
PL	Public Law
PM_{10}	Particulate Matter Less than 10 Microns
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns
POL	Petroleum, Oils, and Lubricants
PSD	Prevention of Significant Deterioration
psf	Per Square Foot
RANW	Range Wing
RCRA	Resource Conservation and Recovery Act
REDHORSE	Rapid Engineers Deployable Heavy Operational Repair Squadron Engineer
RFMDS	Red Flag Measurement and Debriefing System
RMP	Resource Management Plan
ROD	Record of Decision
SAM	Surface-to-Air Missile
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SP	State Park
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxide
TCE	Trichloroethylene
TCP	Traditional Cultural Properties
TSCA	Toxic Substance Control Act
UAS	Unmanned Aerial System
USACE	United States Army Corps of Engineers
USAFWC	United States Air Force Warfare Center
USC	United States Code
USCB	United States Census Bureau
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGCRP	United States Global Change Research Program
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VFR	Visual Flight Rules
VR	Victor Route
VRM	Visual Resources Management
WG	Wing
WGEF	Wind Generating Energy Facility
WINDO	Wing Infrastructure Development Outlook
WMA	Wildlife Management Area
WS	Weapons School
WSA	Weapons Storage Area

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS) analyzes the potential environmental consequences resulting from the United States Air Force (Air Force) proposal to beddown (base) 36 F-35 fighter aircraft and to implement a Force Development Evaluation (FDE) program and a Weapons School (WS) at Nellis Air Force Base (AFB), Nevada. This Final EIS was prepared by the Air Force, Headquarters Air Combat Command (HQ ACC) in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, and Title 32 of the Code of Federal Regulations (CFR) Part 989.

PURPOSE AND NEED FOR THE ACTION

The purpose of the proposed action is to implement the FDE program and WS for the F-35, specifically the F-35A variant designed for the Air Force. The F-35 development and manufacturing processes have been initiated and are running concurrently with evaluation of the aircraft. The goal of the Air Force is to field the most up-to-date aircraft with the most highly trained pilots through the lifecycle of a weapons system. This is achieved through the FDE program and the WS for the aircraft and pilots, respectively.

Force Development Evaluation Program. Throughout the lifecycle of an aircraft of perhaps 30 years or more, many changes occur to the aircraft itself and to the operating environment of the aircraft. These changes include new avionics hardware and software, tactics empirically developed in the field, changing threats and enemy capabilities, and new weaponry, just to name a few. The FDE program is needed to address these changes and keep the Air Force's inventory in the best possible position to combat enemy threats. FDE evaluates, demonstrates, exercises, and/or analyzes operational aircraft to determine their effectiveness and suitability. In addition, FDE identifies and resolves deficiencies during the sustainment portion of an aircraft's lifecycle.

Weapons School. The purpose of and need for the WS is to produce the Air Force's most highly trained weapons and tactics instructors. In turn, these highly trained instructors improve combat capability through superior training and instruction at the unit and base levels. WS graduates provide expertise in the tactical employment and operational planning and execution of integrated air and space power as required under AFI 11-415 *Weapons and Tactics Programs*.

Synergy Between FDE and WS. The FDE program and WS represent essential, but distinct parts of the Air Force's overall mission. These two essential parts of the F-35 program have different purposes, but the same needs. The types of flying activities required in each program are the same and the fundamental supporting assets (i.e., base, airspace) needed by both programs also closely match. Individually and combined, the FDE program and WS involve unique requirements that differ from those associated with

the training activities of operational units. Both programs need specific, identical assets to meet their unique requirements.

PROPOSED ACTION AND NO-ACTION ALTERNATIVE

For the Air Force, ACC is responsible for implementing FDE and WS programs. These programs are best performed at a location that has infrastructure to support the full spectrum of testing and training activities. Nellis AFB, and its associated Nevada Test and Training Range (NTTR) and airspace represent the only ACC Major Range and Test Facility Base (MRTFB) that meets the unique requirements for the F-35 FDE program and WS. Other bases, like Edwards AFB, are MRTFBs, but none meet all the requirements for the FDE program and WS. These requirements include range instrumentation, threat simulation, support for large force training exercises, an integrated battle space environment, and suitable existing infrastructure. Moreover, the synergy between the FDE program and WS already established at Nellis AFB would not exist elsewhere. For this reason, as further discussed in Chapter 2, no other bases were identified as reasonable alternative locations for the F-35 FDE and WS.

The proposed action would involve the following.

- Base 36 F-35 aircraft at Nellis AFB with 12 aircraft for the FDE program and an additional 24 for WS training; as a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first aircraft would arrive in 2012 and the last in 2020.
- Implement the F-35 FDE program at the base in 2012 and implement the WS in 2015.
- Construct, demolish, or modify a variety of base facilities to support the F-35 programs, particularly along the flightline.
- Conduct an additional 17,280 annual airfield operations at Nellis AFB by 2020, and an additional 51,840 annual sortie-operations in NTTR.
- Practice ordnance delivery on approved targets and release of flares in approved airspace.

Nellis AFB is the location of the Air Force's only existing fighter WS. Although the Air Force could replicate the WS at some other location, from the perspectives of economics, operations, and infrastructure requirements, basing the F-35 WS and FDE at Nellis AFB is the most reasonable option and makes sense. No other base, or combination of bases, offers the specific physical or organizational infrastructure necessary to support the unique requirements of the F-35 FDE and WS programs. Nellis AFB, its ranges, and airspace already exist and fulfill the F-35 testing and training program needs. Essentially, the F-35 is considered additive to the on-going Air Force fighter FDE and WS programs at Nellis AFB.

Under the no-action alternative, the F-35 FDE and WS beddown would not occur, and the Air Force would not implement associated construction or personnel increases at Nellis AFB. The F-35 FDE program and WS would not conduct operations at NTTR.

Scoping and Public Involvement

CEQ regulations require an early and open process for identifying significant issues related to a proposed action and for obtaining input from the public prior to making a decision that could potentially affect the environment. These regulations specify public involvement at various junctures in the development of an EIS, including public scoping prior to the preparation of a Draft EIS, and public review of the Draft EIS prior to finalizing the document and making a decision.

Prior to the publication of the Draft EIS, the Air Force issued a Notice of Intent (NOI) in the *Federal Register* on August 23, 2004. After public notification in newspapers and public service announcements on radio stations, five scoping meetings were held September 13 through September 17, 2004, at the following Nevada locations: Carson City, Alamo, Pioche, Pahrump, and Las Vegas. A total of 40 people attended the meetings and provided comments. By the end of the scoping period, October 1, 2004, nine comments and one agency letter were received.

Of the nine comments received from individuals during the scoping meetings, three citizens from Alamo expressed concern about sonic booms – the number, severity, potential for structure (i.e., window) damage, and human disturbance. One commentor asked if a restricted area could be created over the town. Two other areas of concern were how the F-35 would operate and the way in which it would fly within current airspace. In Las Vegas, one commentor asked if the F-35s would be used in the same way at the range (e.g., flights per day, how low, how fast) while another commentor expressed concerns about noise, radar interference, and safety for the residential areas to the east. A person in Pioche commented that during the fall hunting season, deer appeared to be scared by early morning flights, in airspace over the central portion of NTTR. In Carson City, two attendees verbally (i.e., no written comments were received) expressed concern for potential low-altitude flight conflicts over areas being considered for wind generation development under the NTTR airspace.

A letter from the Nevada State Clearinghouse with comments from the State Historic Preservation Officer (SHPO) and Nevada Department of Wildlife was received during the scoping period. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties. The Nevada Department of Wildlife expressed concern for: 1) a neotropical migrating bird, the Phainopepla (a state sensitive species that is found in mesquite/acacia plant communities); 2) the burrowing owl (both a federal and state sensitive species); and 3) the kit fox (a state species with conservation priority). No comments were received from the U.S. Fish and Wildlife Service (USFWS) or Bureau of Land Management (BLM) during the scoping period.

The Notice of Availability of the Draft EIS was published in the *Federal Register* on April 4, 2008 beginning the 45-day public review period. Public hearings were held April 22 through April 24, 2008 in these Nevada locations: Las Vegas, Caliente, and Alamo. These locations were selected for the following reasons: interest in the proposal remained high in Las Vegas and Alamo, and both form part of the affected area; Alamo and Caliente, as indicated by findings in the analysis, were representative communities central under the MOA airspace – both communities revealed interest in the proposal; Pahrump lies outside the affected airspace and showed low levels of interest, whereas Pioche reflected negligible public interest. Seven people attended the three hearings. While none of the attendees provided oral testimony or written comments, three of the attendees expressed opposition to existing and proposed aircraft overflights, suggesting a decrease in home values and quality of life. The Air Force received comment letters from three private individuals and from the following Nevada offices and federal agencies: Department of Comprehensive Planning, Department of Air Quality Management, Nevada State Historic Preservation Office, City of North Las Vegas, U.S. Department of the Interior, and U.S. Environmental Protection Agency (USEPA). Comments were also received from the Consolidated Group of Tribes and Organizations' Document Review Committee. Appendix G provides the comment letters with Air Force responses. The closing date of the comment period was May 19, 2008, but by request of the U.S. EPA, the comment period was extended to May 22, 2008.

Differences Between the Draft EIS and Final EIS

While this Final EIS is, in large part, the same as the Draft EIS, it reflects the consideration of comments received during the public comment period and includes factual corrections, improvements, and/or modifications to the analyses presented in the Draft EIS. Modifications include updated proposed construction projects and start dates, as well as a revised timeframe for the F-35 beddown. Also modified in the Final EIS is a re-evaluation of projected noise impacts. Since the 2008 publication of the Draft EIS, several noise impact metrics have been developed and an F-35 specific noise modeling program created. The noise impact metrics now include speech interference and sleep disturbance; Sections 3.3, 4.3, and Appendix C were revised accordingly. Due to the new noise modeling program, revised projected noise contour bands were also produced and potential impacts presented in Sections 4.3 (Noise), 4.6 (Land Use and Recreation), and 4.8 (Environmental Justice). Air quality evaluations (Sections 3.5 and 4.5) were also updated to reflect changes in proposed construction projects and start dates (Appendix D), the F-35 revised beddown phasing, and the outcome of the conformity determination (Appendix E). None of the modifications made to the Final EIS resulted in substantive changes to the proposed action and the conclusions presented in terms of environmental consequences and impacts remain consistent with those presented in the Draft EIS.

Summary of Environmental Consequences

The analysis in this Final EIS established that the proposed F-35 beddown would result in adverse effects on some resources such as air quality and noise, although none of these impacts would be of sufficient magnitude to require mitigation. Moreover, for most resource categories, only minor or negligible effects would result. Table ES-1 summarizes the consequences for both the proposed action and the no-action alternative.

Table ES-1 Comparison of Alternatives by Resource and Potential Impact	
Proposed Action	***No-Action Alternative***
AIRSPACE AND AIRCRAFT OPERATIONS	
Nellis AFB	
• Increase total Nellis AFB airfield operations by 20 percent • No change to airfield airspace structure or operational procedures; no impact to civil and commercial aviation airspace • No change in departure and arrival routes	• Average annual airfield operations remain at 85,000 • Existing departure and arrival routes would continue to be used
NTTR	
• No change to current special use airspace structure • F-35 would increase current total sortie-operations by 51,840 annually, for a total ranging from 251,840 to 351,840. This would represent a 26 percent increase under the 251,840 use scenario and a 17 percent increase under the 351,840 scenario. This increase would not exceed NTTR capability • A less than 1 percent increase in supersonic activities • No changes or increased need for supersonic-designated airspace • No impact to civil and commercial aviation	• MOAs and restricted areas continued to be used • Continued conducting 200,000 to 300,000 annual sortie-operations in NTTR • Maintain and use existing supersonic-designated airspace • Continued coordination with area Air Traffic Control to ensure safe airspace for all users

<table>
<tr><th colspan="2">Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)</th></tr>
<tr><th>Proposed Action</th><th>No-Action Alternative</th></tr>
<tr><th colspan="2">NOISE</th></tr>
<tr><td colspan="2">Nellis AFB</td></tr>
<tr><td>
• Beddown would generate a 42 percent increase (an additional 7,562 acres) in areas exposed to 65 dB DNL and greater by the year 2020
• 20 Representative locations would experience:
  • increases of between 1 and 3.4 dB DNL in noise levels
  • populations in on-base dormitories would continue to be exposed to PHL in the 80 to 85 dB DNL contour bands
  • an increase in daytime speech interference events when windows are closed 1 to 3 more times an hour; when windows are open, events would increase between 2 and 3 more times per hour
  • an increase in probability of sleep disturbance between 1 and 7 percent with windows closed and 1 and 10 percent with windows open
• Nellis AFB would continue noise abatement procedures to reduce overflights of residential areas and nighttime operations and run-ups
• Noise complaints and annoyance levels in the Nellis AFB vicinity may increase
• No adverse impacts to hearing and health would be anticipated
</td><td>
• Approximately 18,000 acres continue to be exposed to 65 dB DNL and greater noise levels
• For PHL, populations within dormitories would continue to be exposed to 80 to 85 dB DNL contour bands
• Noise abatement and safety procedures would continue to be implemented
</td></tr>
<tr><td colspan="2">NTTR</td></tr>
<tr><td>
• Subsonic noise would increase an average of 3 dB in 12 of the 21 airspace units under the 251,840 sortie-operations scenario and in 4 of the 21 airspace units under the 351,840 sortie-operations scenario
• Supersonic noise would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807 and R-4809 under the 251,840 scenario
• Under the 351,840 scenario, supersonic noise would increase by 1 dB
• Sonic booms would increase by 2 per month in R-4807 and by 1 per month in Desert and Reveille MOAs under the 251,840 scenario
• Under the 351,840 scenario, booms would increase by 2 per month in almost all airspace units with the exception of the Elgin MOA where booms could increase by 4 per month
• Noise complaints and annoyance levels may increase due to increased boom numbers
• No adverse impacts to hearing and health
</td><td>
• Baseline subsonic noise levels would continue to range from less than 45 to 65 dB DNL for the 200,000 and 300,000 scenarios
• Supersonic noise levels would continue to range from less than 45 to 57 dB CDNL under the 200,000 and 300,000 scenarios
• Sonic booms range from 2 to 24 per month at 200,000 sortie-operations per year and 3 to 35 per month at 300,000 sortie-operations per year
</td></tr>
</table>

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
AIR QUALITY	
Nellis AFB	
• *De minimis* levels would be exceeded for CO and NO_x; however, the Air Force has coordinated with Clark County's Department of Air Quality and Environmental Management to include 185 tons of NO_x into their ozone State Implementation Plan (SIP) revision • While there are CO exceedances, they are covered in the Clark County CO SIP so these increases would not be adverse nor preclude the county from NAAQS attainment • No visibility impairments to PSD Class I areas	• Nellis AFB would continue to contribute less than 1 percent of all criteria pollutant emissions in Clark County
NTTR	
• Projected emissions would increase negligibly in Lincoln and Nye counties; this would not change the regional significance from baseline conditions	• Nye and Lincoln Counties (only 5 percent of NTTR airspace falls within Clark County) would continue in attainment for all criteria pollutants • Within Lincoln and Nye counties, NTTR operations would continue to represent a limited regional contributor for NO_x and SO_x
SAFETY	
Nellis AFB	
• No changes in safety due to operations and maintenance, fire and crash response, and munitions use and handling procedures • Additional munitions facilities and expansion of the live ordnance loading area would be constructed to support the increase in airfield operations; this would enhance safety • No anticipated increase to bird/wildlife-aircraft strike hazards or aircraft mishaps above baseline levels therefore, no impacts	• Operations and maintenance, fire and crash response, and munitions use and handling activities conducted on Nellis AFB would continue to be performed in accordance with applicable Air Force safety regulations • The low potential for mishaps would continue • Bird/wildlife-aircraft strikes in the airfield environment would remain minimal; over a 14-year period there have been 233 bird strikes (occurring with over 1 million airfield operations), averaging about 17 per year

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
SAFETY	
NTTR	
• All current fire risk management procedures would remain unaffected due to the F-35 beddown • Estimated time between Class A mishaps would remain low (2 to 45 years) with the increase in NTTR airspace use • Increase in use of flares could cause a negligible (<0.1 percent) increase risk of wildfires; however, existing fire response procedures would adequately address this minimal increase • No significant increase in bird/wildlife-aircraft strike hazards	• A total of approximately 4 to 5 fires, of less than 3 acres, occur annually on the ranges; this would continue • Estimated time between Class A mishaps within NTTR airspace ranges between 3 and 68 years under the 200,000 sortie-operations scenario and 2 and 45 years under the 300,000 sortie-operations scenario • Safety procedures for ordnance and flare use would continue to be enforced to minimize risks • Probability of bird/wildlife-aircraft strikes would continue to be negligible; ten strikes have been reported over the past 10 years
LAND USE AND RECREATION	
Nellis AFB	
• Noise impacts to residential, public, open, and industrial land uses would decrease in acres by 25 percent from baseline conditions • No impact to recreation	• Surrounding areas (industrial, commercial, open, recreational, public, and residential land uses) would continue experiencing noise levels of 65 dB DNL and greater
NTTR	
• No change to land status or land management • 3 dB or less change in subsonic noise and 1 dB or less change in supersonic noise levels over special use land management areas • Recreational areas underlying the Elgin MOA could experience an increase of 4 booms per month with the maximum sortie-operations (351,840) scenario; other areas might expect an increase of up to 2 booms per month • Aircraft emissions and overflights would not impair visual quality	• NTTR lands would continue being primarily managed by DoD, BLM, USFWS, and U.S. Forest Service • Special use land management areas would continue to be exposed to aircraft operations
SOCIOECONOMICS AND INFRASTRUCTURE	
Nellis AFB	
• Net increase of 412 active duty personnel at Nellis AFB by 2020 (3.4 percent increase over 2006) • Nearly $28.3 million in additional payroll disbursements with increased personnel • Adequate housing and utility supply; no adverse impact on area public schools • Increase in traffic during construction would be temporary and localized; should not adversely impact existing delays experienced by on-base traffic • No appreciable changes to utilities ability to meet minor increases in demand	• Nellis AFB active duty or civilian workforce would remain similar to those found currently • Total annual payroll expenditures would remain consistent • Housing and utility supply would continue without restraint and public school enrollment would remain similar to levels found under baseline conditions • Delays at particular Nellis AFB intersections would continue as they currently exist

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)

Proposed Action	*No-Action Alternative*
ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN	
Nellis AFB	
• About 57,736 people would be affected by noise levels within 65 dB DNL and greater contour bands, an increase of 17,000 over baseline levels • Of this total, 30,257 represent minority populations, an increase of 12,015 from baseline conditions • Low-income populations would increase from 5,406 to 6,673 (or by 1,267 individuals) • Schools would be exposed to noise levels of 65 dB DNL and greater; however, safety risks to children would not increase	• Impacts to human health and environmental conditions in minority and low-income communities would remain similar to conditions found currently • Schools currently affected by noise levels 65 dB DNL and greater would continue to be exposed to these noise levels
SOILS AND WATER RESOURCES	
Nellis AFB	
• Approximately 36 acres would be disturbed over a 5-year construction period; most of the proposed construction would occur over previously developed land or replace existing buildings • Best management practices (e.g., erosion and dust controls) for construction would minimize the potential for erosion • No adverse effects to availability of surface water or groundwater; no additional water right required	• Nellis AFB would continue to implement standard construction and erosion control procedures to limit erosion for planned/approved construction projects • Existing water availability and use rates would continue to be adequate for base missions and personnel
BIOLOGICAL RESOURCES	
Nellis AFB	
• One federally-listed special status species (desert tortoise) found on Nellis AFB; the base would avoid this species and consult with USFWS as applicable • Only one plant (a state-species of concern) is known to occur on Nellis AFB; the base would work with the Nevada Department of Fish and Wildlife to avoid impacts to this sensitive species	• Existing plans would continue to address management and protection of the desert tortoise • The status of one plant state species of concern would not change; plans to manage and protect this species would not change
NTTR	
• Flare use would increase, but the risk of wildfire would remain minimal • Use of existing targets; therefore, no new ground disturbance on NTTR • No changes in existing impacts to the desert tortoise would be anticipated; implementation of the rules and procedures in management of this species would continue to minimize any potential impacts • Increases to subsonic (3 dB) and supersonic (1 dB) noise would not adversely impact wildlife	• The only known federally-listed species occurring on the ranges is the desert tortoise within the South Range; implementation of existing rules and procedures in relation to this species would continue

Table ES-1 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
CULTURAL RESOURCES	
Nellis AFB	
• Construction would avoid a National Register-eligible site in Area II • Cold War structure inventory is in progress but any potentially eligible sites would be avoided • No effect on traditional cultural resources	• No change resulting from the F-35 beddown to existing cultural resource conditions • No traditional cultural resources on base or in area immediately adjacent to the base
NTTR	
• Noise and sonic booms unlikely to affect archaeological sites or architectural resources • Increase of 1 to 4 sonic booms per month in the airspace units could be considered to affect setting of sacred and traditional use areas, but not adversely	• Conditions at 5,000 archaeological sites estimated beneath NTTR airspace would remain similar to what is found currently • Over 50 historic mining sites, rock art, traditional use areas, and sacred sites in NTTR would continue to be managed and protected through implementation of existing Nellis AFB plans
HAZARDOUS MATERIALS AND WASTE	
Nellis AFB	
• No change in large quantity generator status • No change to existing management protocols required • Four potential F-35 construction sites may occur above ERP sites, an ERP waiver would be required prior to construction • No new types of hazardous materials would be introduced • F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year, approximately a 6 percent increase	• Nellis AFB would continue to be a large quantity generator • Procedures for renovation or demolition activities would continue to be reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos

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1.0 PURPOSE AND NEED FOR THE ACTION

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Federal law and United States Air Force (Air Force) policy, as detailed below, require implementation of a Force Development Evaluation (FDE) program and Weapons School (WS) training for all new aircraft. To meet these requirements for the F-35[1], the Air Force proposes to base 12 F-35 aircraft for the FDE program and an additional 24 F-35 aircraft for WS training. As required by the National Environmental Policy Act (NEPA) and promulgated under the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Part 1502.14[d]), this Environmental Impact Statement (EIS) analyzes the potential impacts of the beddown of the 36 F-35 aircraft and the implementation of the FDE program and WS at Nellis Air Force Base (AFB). This EIS also analyzes the no-action alternative to the proposed action.

The following section presents the purpose and need for the proposed F-35 beddown for the FDE program and WS. In this section, the Air Force presents the strategic, tactical, statutory, regulatory, and training basis for implementing the proposed action. It also describes the individual and synergistic importance of the FDE program and WS.

1.2 BACKGROUND FOR THE PURPOSE AND NEED

The Air Force strategy to modernize the aging inventory of legacy aircraft with an almost all-stealth fighter force by 2025 began with the F-22[2] Raptor in the early 1990s. In 1994, the United States Congress and the Department of Defense (DoD) determined that the F-35 Joint Strike Fighter (JSF) would be developed to replace and supplement Air Force legacy fighter and attack aircraft (CRS 2004) such as the F-16 Fighting Falcon and A-10 Thunderbolt II.

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[1] This action involves basing of the F-35A, the conventional landing/takeoff variant of the F-35 developed for the Air Force. Throughout the remainder of this document, use of the term F-35 refers predominantly to the F-35A model.

[2] In the first portion of the F-22 program, prior to operational beddowns, the Air Force designated the aircraft as an F-22. This designation correlated with the major role anticipated for the new aircraft—air superiority emphasizing air-to-air combat. In the NEPA documentation (Air Force 1999a) for the FDE program and WS beddown, the F-22 designator was used. Subsequent testing, development, and deployment resulted in further evolution of the aircraft's capabilities and missions, particularly air-to-ground operations. As such, the Air Force redesignated the aircraft as the F/A-22. The aircraft designation was the F/A-22 for a short time before being renamed F-22A in December 2005. Within this EIS, the Raptor will be termed the F-22A unless referencing specific documentation pre-dating that designation.

Existing and anticipated foreign air defense systems have reached levels of effectiveness sufficient to pose a significant threat to current legacy fighter aircraft. In addition, the worldwide prevalence of sophisticated air-to-air and surface-to-air missiles continues to grow, increasing the number of threats to which legacy aircraft are vulnerable. In 1993, the Joint Advance Strike Technology (JAST) program was established to define and develop a common joint strike fighter airframe that would fill multiple combat roles and meet the growing sophistication of enemy defense systems. The F-35 is a supersonic, single-seat, single-engine aircraft capable of performing and surviving lethal strike warfare missions. There are three variations of the F-35: the Air Force F-35A, Conventional Take-Off and Landing (CTOL) version; the Marine Corps F-35B, Short Take-Off and Vertical Landing (STOVL) version; and the Navy F-35C, Carrier Variant (CV).

1.2.1 F-35 Aircraft Characteristics

The Air Force designated the F-35 to replace and supplement existing, but aging legacy fighter fleets, and to complement the F-22A. In that regard, these new aircraft would fulfill the wide range of roles and missions conducted by legacy fighter aircraft. As such, the Air Force F-35 CTOL variant embodies critical combat capabilities to fulfill multiple mission roles emphasizing air-to-ground missions. The F-35 epitomizes the characteristics needed for this role, offering a unique combination of capabilities.

- *Stealth*: Design features and radar-absorbent composite materials make the F-35 harder to detect than conventional aircraft of similar size.
- *Range and Supersonic Speed* – The F-35 offers an equivalent or greater combat radius than legacy fighter aircraft while performing at substantially higher speeds than some legacy aircraft. The higher speeds and lower observability make Air Force pilots less vulnerable to enemy aircraft and ground-based threats.
- *Sensor Integration to Support Precision Munitions* – New F-35 computer systems, combined with an internal munitions bay, permit Air Force pilots to detect enemy threats and deliver precision munitions at substantially greater distances than supported by legacy aircraft.
- *Comprehensive Combat Information Systems* – Highly sophisticated avionics systems, including a helmet mounted display, are integrated throughout the F-35 to provide the pilot information from many sources and produce a clear, easily understood picture of the combat situation.
- *Reduced Maintenance Costs* – Computerized self-tests of all systems, improved maintenance, and other autonomic logistics information system components reduce both maintenance time and costs.

The F-35, a single-seat, all weather fighter receives its power from one F135 Pratt and Whitney jet engine capable of supplying approximately 35,000 to 40,000 pounds of thrust and speed up to Mach 1.5. Capable of employing air-to-ground, air-to-air, and guided weapons from an internal weapons bay, the F-35 also offers a 25-mm cannon for close air support and anti-armor missions. It also employs defensive

countermeasures such as flares, although its stealth characteristics would likely reduce the need for such measures.

1.2.2 F-35 Development and Deployment Process

To fulfill these roles, the Air Force must prepare F-35 aircrews to accomplish its missions. In preparation, the F-35 weapons system must be fully tested, tactics must be developed and documented, and this information must be taught to pilots and support personnel. The Air Force uses a standard process for weapons system acquisition, production, testing, and deployment. Several steps occur during the process:

- Statement of Operational Need
- Congressional Funding
- Concept Demonstration
- Systems Development and Demonstration
- Production
- Acceptance Testing
- Initial Operational Testing and Evaluation
- Force Development Evaluation
- Weapons School
- Future Beddowns of Operational Units

Through the systematic process outlined above, the Air Force must ensure that:

1. the F-35 receives thorough, intensive testing and evaluation to ensure its effective, safe operation;
2. the FDE program and WS continue to refine the capabilities of the F-35 and improve tactics employed by the F-35 for as long as the aircraft remains part of the Air Force inventory; and
3. environmental documentation, developed in accordance with NEPA, the Clean Air Act, and all other applicable regulations have been or will be prepared for each major action within the process, including future beddowns of operational F-35s.

The requirement that led to the F-35 was identified through the process described in Air Force Instruction (AFI) 10-601, *Mission Needs and Operational Requirements Guidance and Procedures*. During the 1980s, the Air Force assessed its tactical capabilities against projected threats and determined that a multi-role aircraft deficiency would emerge in the foreseeable future. Such a deficiency could jeopardize the United States' ability to ensure that its forces have the freedom of action to conduct operations against opposing forces. In 1993, the DoD created the JAST program to conduct a major tactical aviation review. The JAST determined that the JSF would best meet the long-term mission needs of Air Force, Navy, Marine, and allied air forces. This joint service project determined a need to produce the JSF aircraft in three variants: F-35A conventional take-off and landing (Air Force), F-35C carrier based (Navy), and the

F-35B short take-off and vertical landing version (Marine Corps) to meet existing and future operational missions (CRS 2004). Fiscal legislation from Congress in 1995 supported F-35 development and manufacture. Beginning in 1996, concept demonstration began and demonstrator aircraft flew in 2000 and 2001. These satisfactory results initiated the systems development and demonstration phase.

Since 2001, the F-35 program has been progressing through the Systems Design and Development phase to include Initial Operational Test and Evaluation (IOT&E) activities. The Air Force plans to begin the F-35 FDE program by fiscal year 2012 (FY12) with FDE activities supporting the FY14 initial operational capabilities (IOC). The overall F-35 IOT&E would ensure that the F-35 meets mandatory operational capabilities. The FDE program lasts as long as the aircraft remains in the Air Force inventory, repeatedly testing and evaluating the aircraft and its systems to ensure continued fulfillment of operational requirements. FDE also explores the use of new flight techniques and tactics for aircraft performance, supporting pilot development and training programs. By testing capabilities of an aircraft in tactical situations, including air-to-ground and air-to-air and electronic combat operations, FDE provides unique input on tactics to the WS and operational units.

The WS represents an essential activity also performed throughout the life of the aircraft in the Air Force inventory. As established in Multi-Command Regulation 55-120, the WS conducts graduate-level instructor courses in weapons and tactics employment. The WS offers academic courses and flight training on specific aircraft to qualified instructor pilots. Upon completion of WS courses, which include 2 weeks of combat training exercises, graduate officers return to their home units to provide advanced instruction to unit pilots on employing the aircraft for its mission. As currently planned under the proposed action, F-35 WS graduates from Nellis AFB would return to operational squadrons in FY17.

Beginning FY11, Air Education and Training Command would receive F-35 aircraft to establish pilot training and begin qualifying pilots. To accomplish this training, Air Education and Training Command would first establish a training squadron. Members of this squadron would complete F-35 pilot training and successfully perform the academic work and demonstrate the flying skills necessary to achieve instructor status. Some of these new instructor pilots would be assigned to operational units planned to receive F-35s. Some would also become WS instructors. By FY14, a sufficient number of qualified instructor pilots would be ready to receive the advanced training of the WS.

The ultimate goal of the F-35 development and deployment process is to provide Air Force operational units with a proven, tested aircraft, as well as tactics and operational guidance to meet mission requirements. The Air Force will prepare appropriate environmental analyses for any future F-35 beddowns for training and operational units.

1.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to implement the F-35 FDE program and WS. F-35 development and manufacturing processes have been initiated and evaluation of the aircraft is currently taking place. The goal of the Air Force is to field the most up-to-date aircraft with the most highly trained pilots through the lifecycle of the weapons system. This is achieved through the FDE program and the WS for the aircraft and pilots, respectively.

1.3.1 Force Development Evaluation Program

Throughout the lifecycle of an aircraft, perhaps 30 years or more, many changes occur to the aircraft itself and to the operating environment of the aircraft. These changes include new avionics hardware and software, tactics empirically developed in the field, changing threats and enemy capabilities, and new weaponry. The FDE program is needed to address these changes and keep the Air Force's inventory in the best possible position to combat enemy threats. FDE evaluates, demonstrates, exercises, and/or analyzes field operational aircraft to determine their effectiveness and suitability. In addition, FDE identifies and resolves deficiencies during the sustainment portion of an aircraft's lifecycle.

In accordance with Title 10, Section 2399 of the United States Code (U.S.C.), the DoD and the Air Force must test major weapon systems prior to any major defense acquisition. In addition, AFI 99-102, *Operational Test and Evaluation* (Section 2.1), directs that "OT&E (of which FDE is a part) will be conducted in as realistic an operational environment as possible and practicable, and identify and help resolve deficiencies as early as possible. These conditions must be representative of both combat stress and peacetime operational conditions." The AFI defines the needed elements of FDE and explains how the Air Force major command operating the aircraft plans and conducts FDE until the aircraft is retired.

For the F-35, Air Combat Command (ACC) is the major command responsible for implementing the Air Force FDE program. The FDE program fulfills several important functions:

- refines employment doctrine and tactics in response to changing threats;
- develops or refines operational procedures and training programs;
- evaluates changes to the F-35 aircraft to repair newly identified deficiencies and verifies they have been corrected throughout the entire time the aircraft is in the Air Force inventory;
- explores tactical means of meeting changing operational requirements as long as the aircraft remains in the inventory;
- evaluates operational flight programs, other software changes, pre-planned product improvements, modifications, upgrades, mission data updates, and other improvements or changes as long as the F-35 is in the inventory;

- researches, demonstrates, exercises, analyzes, and evaluates tactics against anticipated threats; and
- ensures proper aircraft performance in combat by providing training, information on operational capabilities, and new requirements.

1.3.2 Weapons School

The purpose of and need for the WS is to produce the Air Force's most highly trained weapons and tactics instructors. In turn, these highly trained instructors improve combat capability through superior training and instruction at the unit and base levels. WS graduates provide expertise in the tactical employment and operational planning and execution of integrated air and space power as required under AFI 11-415 *Weapons and Tactics Programs*.

Under AFI 11-415, ACC must establish and maintain a WS for each aircraft type in its inventory. This program operates throughout the life of the aircraft, adapting to changes in technology, tactics, and threats. Feedback to and from the FDE program is essential to the WS since it applies, evaluates, and refines tactics developed under FDE. The WS provides up-to-date training for pilots already qualified to fly the aircraft. With tactics and combat training as its focus, the WS offers rigorous, intensive, and realistic instruction that enables WS graduates to effectively teach combat skills to members of their home operational units. The WS:

- provides graduate-level training for weapons and tactics for the F-35 aircraft;
- prepares graduates to instruct other pilots in the most up-to-date tactics and capabilities, thereby readying operational F-35 units for combat missions against potential enemy threats; and
- includes intensive combat training exercises offering the realism needed to test and hone the skills and knowledge of the graduates.

1.3.3 Synergy Between Force Development Evaluation and Weapons School

The FDE program and WS represent essential but distinct parts of the Air Force's overall mission. These two essential parts of the F-35 program have different purposes but the same needs. The types of flying activities required in each program are the same and the fundamental supporting assets (i.e., base, airspace) needed by both programs are also closely matched.

Individually and combined, the FDE program and WS involve unique requirements that differ from those associated with the training activities of operational units. Both programs need specific, identical assets to meet their unique requirements. For the F-35, these fall into three major categories.

- *Airspace and Ranges*. The F-35 FDE program and WS each need military airspace, secure training ranges, and associated ground facilities capable of accommodating specific operational

and training activities. Such activities are very similar for both FDE and WS; only their purpose differs between the two programs.

- *Professional Expertise and Opportunities for Realistic Operations.* F-35 basing must provide personnel with the opportunity to perform realistic operations and the training needed to realize the full value of the FDE and WS programs, along with the associated cadre of experienced pilots.
- *Base*. A base for FDE and WS must offer the physical and organizational infrastructure to support these programs.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Air Force proposal to implement the F-35 FDE program and WS at Nellis AFB, including operational changes and construction. As required under the CEQ (40 CFR Part 1502.14(d)), it also describes the no-action alternative, in which the F-35 FDE program and WS would not be implemented. The chapter also evaluates the process and criteria used to define the location of the F-35 beddown. As a result of this evaluation and application of FDE and WS basing criteria, the Air Force determined that Nellis AFB comprised the only reasonable location for the proposed action.

The Air Force proposes to base 36 F-35 aircraft at Nellis AFB: 12 for the FDE program and an additional 24 F-35 aircraft for WS training. Under this beddown proposal, the F-35 would supplement and eventually replace the aging legacy fighter aircraft at Nellis AFB. As a phased program reliant on manufacturing progress and other elements of F-35 deployment, the first F-35 would arrive in 2012 and the last in 2020. This proposal would also involve adding to the existing inventory of aircraft; construction, demolition, and/or modification of base facilities; and implementation of flight activities for the FDE program and WS within Nevada Test and Training Range (NTTR). No net changes in overall airspace configuration are anticipated with the F-35 beddown. The details of the proposed action form the basis for analysis of potential environmental impacts. Assessment of the F-35 capabilities and missions reveals that Nellis AFB represents the single location that reasonably provides for the specific and unique requirements of the F-35 FDE program and WS.

2.1 BASING REQUIREMENTS FOR F-35 FDE PROGRAM AND WS

2.1.1 Test and Training Missions

The basis for testing and training derives from the combat missions expected and planned for an aircraft. Table 2-1 outlines the representative test and training mission activities derived from legacy fighter aircraft missions that would be applied to the F-35. It also presents data on the types of airspace generally used for each activity.

Table 2-1 Projected FDE Program and WS Test and Training Activities Required for the F-35

Activity	*Tasks*	*Airspace Type*
Aircraft Handling Characteristics	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering, gun tracking, offensive and defensive positioning, simulated fueling, stall recovery	MOA* and ATCAA**
Basic Fighter Maneuvers	Recognize all offensive/defensive weapons situations, defeat enemy weapons employment, G-force awareness, offensive/defensive maneuvering, visual missile defense, beyond visual defense, maneuvering for weapons use, defensive countermeasures use	MOA and ATCAA
Surface Attack Tactics	2 vs. 4, or 4 vs. 4 aircraft, low to high altitude tactical weapons delivery and escape maneuvers (day and night)	MOA, Restricted Areas (over weapons delivery ranges)
Air Combat Maneuvers	Multi-aircraft formations and tactics, systems check, G-force awareness, 2 vs. 4 and 4 vs. 6 aircraft intercepts, combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters	MOA , Restricted Areas
Low Altitude Training	1 or 2 aircraft offensive and defensive operations at low altitude, G-force awareness at low altitude, handling, turns, tactical formations, navigation, threat awareness, defensive response, defensive counter measure (flares) use, low to high and high to low altitude intercepts, missile defense, combat air patrol against low/medium altitude adversaries	MOA, Restricted Areas
Tactical Intercepts	2 vs. 4 and 4 vs. 6 tactical intercepts, G-force awareness, electronic countermeasures, lead and formation flying	MOA, Restricted Areas, and ATCAA
Night Operations	4 vs. 4 aircraft intercepts and defense, defensive countermeasure (flare) use, maneuvering for weapons use	MOA, Restricted Areas, and ATCAA
Dissimilar Air Combat Tactics	Multi-aircraft and multi-adversary (involving dozens of aircraft) defense and combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, strike-force rendezvous and protection	MOA, Restricted Areas, and ATCAA
Mission Employment	Multi-aircraft and multi-adversary (involving dozens of aircraft) composite strike force exercise (day and night), systems check, air refueling, strike force defense and escort, air intercepts, electronic countermeasures, combat air patrol, defense against composite force, bomber intercepts, defensive countermeasure (flare) use	MOA, Restricted Areas, and ATCAA
Ordnance Delivery	Single to multiple aircraft attacking a wide range of ground-targets using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, and combat scenarios	Restricted Airspace (over weapons delivery ranges) MOA

Source: AFI 11-2F-16, AFI 11-2F-22
* MOA– military operations area
** ATCAA– air traffic control assigned airspace

2.1.2 Overall Considerations

Several considerations must be applied when selecting the base to support the specific F-35 FDE program and WS needs. These considerations, as described below, are important both in supporting the FDE program and WS, as well as for defining the type of location needed for the beddown.

1. ***Integrated Battlespace for Testing and Training.*** An integrated battlespace environment for testing and training consists of airspace, range, and other assets that support the full spectrum of operations that could be encountered in combat. Such an environment supports realistic activities, including major exercises involving many types of aircraft in addition to aircraft adopting the roles and tactics of adversaries. An integrated battlespace environment also offers a variety and arrangement of ground-based threats that require aircrews to operate and react as they would in combat. It provides air-to-air and air-to-ground testing and training, employing the equipment and facilities to monitor and review aircraft and aircrew performance. Since the F-35 FDE program and WS must test and train under as realistic conditions as feasible, a nearby location offering an integrated battlespace environment is required.

2. ***Interaction of F-35 FDE Program and WS.*** Interaction between the staffs of the FDE program and WS enhances the professional expertise of each program. FDE staff tests and evaluates the operational capabilities of an aircraft and uses this information to develop tactics. These capabilities and tactics are then incorporated into the WS program. The WS staff also evaluates the utility and value of the tactics through its intensive training course, providing feedback to the FDE staff on changes and refinements in tactics. This feedback process forms a continuous improvement cycle, or synergy, between the two programs as long as the aircraft remain in the Air Force inventory. Locating both programs at the same base would enhance the synergy, allowing consistent interaction between the F-35 FDE program and WS.

3. ***Maximize Use of Existing Infrastructure to Accommodate the F-35 FDE Program and WS.*** A base that requires minimal changes to accommodate these F-35 programs would offer a more efficient and effective alternative than a site that needed extensive changes and/or improvements. Such efficiency and effectiveness can be measured in terms of costs. For example, fewer infrastructure improvements and personnel changes would translate into lower overall costs. Similarly, minimized changes may also equate to less potential for environmental impacts; fewer infrastructure changes mean less construction and ground disturbance that could affect the environment.

4. ***Support the Functional and Operational Characteristics of the F-35.*** The functional and operational characteristics designed into the F-35 emphasize an air-to-ground combat role but also recognize the F-35's ability to perform air-to-air missions. These characteristics consist of

maneuverability, stealth, comprehensive yet simple combat information systems, as well as maintainability, sustainability, reliability, and responsiveness. The F-35 aircraft will possess many of the functional and operational characteristics of legacy aircraft, allowing it to fulfill their missions effectively and efficiently. Table 2-2 outlines the characteristics and associated operational requirements for F-35 test and evaluation.

Table 2-2 F-35 Operational Characteristics and Requirements

Operational Characteristics	*Operational Requirements*
Agility and Maneuverability	• Adequate airspace in which to employ the full spectrum of combat tactics • Engage ground-based and adversary aircraft threats employing combat tactics • Operate in a wide range of modes for air-to-ground missions (e.g., interdiction, armor, close air support) against a variety of target types
Range and Supersonic Speed	• Provide airspace capable of supporting the multi-role missions including restricted areas over targets • Sufficient airspace in which to fly supersonic during tactics employment • Simulate enemy capabilities and tactics by engaging adversary aircraft
Stealth	• Ability to safely test and use stealth in tactics that minimize conflicts with commercial and civil aviation • Employ simulated adversary instrumentation and threat radar in operations
Comprehensive Combat Information Systems	• Opportunity to employ systems in large force exercises involving numerous and different aircraft types • Use ground-based simulated threats and instrumentation to test information systems in combat tactics
Reduced Maintenance Costs	• Adequate facilities to employ large force, multi-day exercises simulating combat operations tempo • Employ full spectrum of tactics and capabilities to evaluate aircraft systems
Sensor Integration to Support Precision Munitions	• Ability to employ full range of air-to-ground ordnance against spectrum of target types expected in combat • Use defensive countermeasures in combat tactics

2.1.3 Criteria for Basing F-35 FDE Program and WS

Using these overall considerations and also considering the combat role of the F-35 aircraft, the Air Force applied nine criteria as basing requirements for the F-35 FDE program and WS.

1. ***ACC and Major Range and Test Facility Base (MRTFB).*** Under Air Force policy and instructions, implementation of the FDE program and WS is the responsibility of the major command operating the new aircraft. ACC is the Air Force's primary fighter command and is the

major command receiving the F-35s, so ACC is responsible for the F-35 FDE program and WS, as well as eventual deployment of the aircraft to the Air Force operational units. To ensure it meets its responsibilities, ACC must maintain command and control over these programs throughout their existence. In addition, FDE activities occur on an MRTFB as described in DoD 32-00.11. Basing the F-35 FDE program and WS at an ACC base designated as a MRTFB would aid in fulfilling these responsibilities because of the special funding authorities and assets associated with such bases. A location suitable for the F-35 WS must not only share many of the same attributes characteristic of an MRTFB but also offer a training range capable of supporting full-scale exercises and instrumentation for comprehensive scoring and debriefing.

2. ***Runway Length.*** Due to the expected operational parameters for the F-35 under the FDE program and WS, an 8,000 foot-long runway that includes an arresting cable would be required.

3. ***Ramp Space.*** The FDE program and WS, when fully established, would require a total of 36 F-35 aircraft to meet the requirements of testing and tactics development, as well as providing for graduate-level combat training of instructor pilots. Therefore, a base must provide sufficient ramp space to park 36 F-35s for the FDE program and WS, or it must permit safe expansion of ramp space.

4. ***Security Restrictions.*** Because the F-35 represents the newest and most sophisticated strike fighter aircraft in the world, knowledge of its systems and capabilities would provide a potential advantage to adversaries. For this reason, the ability to observe specific FDE program and WS operations must be restricted. Both the base for the F-35 beddown and a large proportion of the ground underlying the airspace associated with the base must prohibit unauthorized observation of these aircraft operations.

5. ***Airspace.*** The F-35 FDE program and WS need a large airspace area that overlies land containing air-to-ground targets, restricted areas for training and testing, and authorized airspace for supersonic flight activities. To provide sufficient airspace for combat maneuvering by F-35 aircraft, the base must have nearby military operations areas (MOAs), restricted airspace, or a combination of both over land, measuring at least 100 by 50 nautical miles (nm). This area should offer sufficient airspace for an F-35 to identify an adversary aircraft, lock-on with a weapons system, and close with the opposing aircraft. Due to the increasing capabilities of non-U.S. advanced fighters and air-to-air missiles, airspace offering 100-nm separation between opposing aircraft should be considered a minimum. This size of airspace also provides for maneuvering associated with air-to-ground missions. The airspace must also permit substantial vertical maneuvering, offering altitudes from surface or near surface to 50,000 feet mean sea level (MSL) or higher. Since the upper altitudes of MOAs top out at 18,000 feet MSL, the airspace

also needs to include air traffic control assigned airspace (ATCAA) above the MOAs to accommodate the training requirements.

6. ***Ordnance Use and Ranges.*** Under an FDE program and WS, the functionality of all systems, including ordnance delivery systems, requires evaluation and use under tactical conditions. Since the F-35 will perform air-to-ground missions an estimated 65 percent of the time, the availability of a full spectrum of air-to-ground training assets represents an essential criterion. To fully evaluate and use these systems, the FDE program and WS must conduct test and training activities at a tactical range that permits delivery of training (inert or nonexplosive) and live (explosive) ordnance using myriad techniques and tactics. Aircraft and weapons performance must also be monitored from the point of release to the point of impact. For the F-35 FDE program and WS, a range must be available that provides full scoring feedback systems for weapons use. Under the F-35 primary mission, it is expected to carry the Joint Direct Attack Munitions (JDAM) as well as other ordnance used by existing aircraft in the Air Force inventory. A range that would also support the F-35 air-to-air mission forms another requirement for basing.

7. ***Range Instrumentation System***. A significant proportion of F-35 FDE program and WS activities would involve employing and evaluating the full range of maneuvers that would be used in combat. These activities, in part, test the capabilities of the aircraft and pilot in realistic combat training situations. To provide the realism needed for these activities, the F-35 must engage in combat training with other aircraft and against adversary aircraft. A range instrumentation system, therefore, must provide for live monitoring and recording of these flight activities. Instructors and pilots can then review the training actions and use this feedback to improve performance and tactics. Testing and training regularly involve dozens of aircraft, so the base and airspace supporting the F-35 FDE program and WS must offer an instrumentation system capable of simultaneously monitoring and recording multiple aircraft within the ranges.

8. ***Realistic Threats.*** An important element of the F-35's value to the Air Force stems from its expected capability to avoid and defeat the variety of ground-based surface-to-air missile and anti-aircraft-artillery systems maintained by potential enemies of the United States. To ensure and refine that capability and the tactics used in its employment, the F-35 FDE program and WS need to operate against simulated ground-based threats that provide the variability and realism expected in actual combat. Therefore, the F-35 should operate in airspace that overlies an array of realistic, flexible electronic emitters that simulate the types of enemy radar anticipated in a variety of combat scenarios. In combating these threats, the F-35 must use its full capabilities, including defensive countermeasures. As such, any location for the F-35 beddown needs to offer training areas authorized for flare use.

9. ***Training Exercises*.** The FDE program and WS contribute to pilot readiness in order to successfully perform combat missions. To augment the synergy needed for the FDE program and WS, the F-35 must engage in realistic combat training with other "friendly" aircraft and against adversary aircraft. To achieve this type of training, a base must offer an organizational structure and mission, as well as access to airspace and other interrelated training assets that promote interaction of the F-35 with a variety of other aircraft through major exercises.

2.1.4 Identification of Basing Location for F-35 FDE Program and WS

To meet the specific and unique requirements of the F-35 FDE program and WS, a location must satisfy the overall considerations as well as fulfill each basing criteria. Support of both test and training missions forms, along with the required facilities and infrastructure, essential factors defining whether a base can meet the purpose and need for this proposed action. As described below, the Air Force considered the attributes of the 65 major active Air Force bases in the United States relative to the requirements. Only one location, Nellis AFB and the associated NTTR, meets these requirements.

Applying Overall Considerations to Nellis AFB

1. ***Integrated Battlespace Environment for Testing and Training.*** NTTR exceeds the basing requirements, offering one of the best sets of facilities, ranges, infrastructure, and airspace to provide an integrated battlespace environment.

2. ***Interaction of the F-35 FDE Program and WS*.** Nellis AFB offers the unique opportunity for interaction between the F-35 FDE program and WS. The Air Force needs to test and evaluate the operational characteristics of the F-35 aircraft through the FDE program. The WS staff needs to incorporate the results of tactics developed through test and evaluation into the WS curriculum so that state-of-the-art tactics and techniques can be taught to the pilots from operational F-35 squadrons located throughout the world. F-35 tactics developed by the FDE program would be used in a wide range of simulated combat conditions by these students and instructors. As threats change through time, tactics would require consistent re-evaluation and refinement by the FDE staff. Co-locating the FDE program and WS at the same facility would create a continuous tactics improvement cycle. It would permit FDE and WS pilots to interact daily, exchanging information, and acquiring knowledge through face-to-face briefings/debriefings. Nellis AFB has been and remains the Air Force's only location for both the fighter aircraft FDE program and WS. This personnel interaction between the FDE program and the WS at Nellis AFB has existed for many years and currently supports other aircraft (e.g., F-22As, F-16s, A-10s, etc.). This interaction, or synergy, has proven invaluable to developing the full combat potential of the aircraft and the aircrews. Synergy is further enhanced because both the F-35 FDE program and WS fall under the direct command of the United States Air Force Warfare Center (USAFWC).

3. ***Maximize Use of Existing Infrastructure*.** Basing the F-35 FDE program and WS at Nellis AFB would require little change to its existing infrastructure. To accommodate the specific organizational and operational requirements of these two F-35 programs, no changes would need to occur in Nellis AFB's organization or structure, its associated ranges or airspace, its security measures, range instrumentation and threat simulators, or major force exercises. Nellis AFB has already developed and upgraded many general infrastructure requirements with the F-22A beddown. Only on-base construction and facility upgrades would be needed for the F-35. The FDE program and WS could be directly integrated into the long-established testing and training activities that form part of the daily routine for the base.

Applying Basing Criteria to Nellis AFB

These basing criteria, and the F-35 operational characteristics, as well as the flying requirements and mission considerations listed in Section 2.1.2, are addressed below.

1. ***ACC Major Range and Test Facility Base*.** As an ACC base and a MRTFB, Nellis AFB and NTTR meet this criterion. Of the 16 Army, Navy, Air Force, and DoD MRTFBs designated by the DoD's Operational Test and Evaluation Division, NTTR represents such a facility under ACC command and control. There already exists a Test and Evaluation Squadron and Weapons School at Nellis AFB to receive the F-35s and incorporate them into their missions without duplication of personnel and resources. In addition to its status as an MRTFB, NTTR comprises a fully capable training range hosting many multi-force exercises annually.

2. ***Runway Length*.** Nellis AFB includes two runways, each measuring more than 10,000 feet in length and exceeding the 8,000-foot criterion for the F-35 FDE program and WS. There are also arresting cables to meet this criterion.

3. ***Ramp Space*.** Nellis AFB can accommodate over 140 aircraft on its ramps at the same time. While current and near future inventories of aircraft at the base remain at 113, the combination of aircraft from large force exercises and the F-35 beddown creates the need for some additional ramp space. Nellis AFB has safe and secure areas to accommodate this needed ramp expansion.

4. ***Security Restrictions*.** Nellis AFB offers standard, high-level Air Force security, particularly along the flightline and ramp areas. No unauthorized individuals may enter the base, and security forces guard all entry points and the base boundary. The base currently houses highly-protected aircraft like the F-22A. NTTR offers close to 3 million acres of land restricted from public entry and is patrolled and/or monitored by security forces.

5. ***Airspace.*** Airspace comprising NTTR lies within 20 nm of Nellis AFB. It includes MOAs and restricted areas that cover approximately 150 by 80 nm and contiguous airspace that exceed the 100 by 50 nm criterion. All of this airspace overlies land, with roughly one-half extending from the surface to unlimited altitudes and the other half extending from 100 feet above ground level (AGL) to 60,000 feet MSL or higher (including ATCAA). Varied terrain, including mountains and expanses of flat desert, underlie this airspace. All NTTR airspace supports supersonic flight, although at differing altitudes, with portions authorized for flights as low as 100 feet AGL (in a restricted area only) and as high as 60,000 feet MSL. With these attributes, the NTTR airspace associated with Nellis AFB meets the specific criteria for basing the F-35 FDE program and WS.

6. ***Ordnance Use and Ranges.*** NTTR, managed and operated by Nellis AFB, meets this basing criterion. It includes more than 2,000 targets within 195 target complexes. A total of 81 target complexes permit ordnance delivery with live (explosive) weapons ranging from 5.56-caliber rounds to 2,000-pound bombs or heavier. Tactical targets within NTTR also permit use of inert (non-explosive) training ordnance. Almost every type of conventional (i.e., non-nuclear) air-to-ground ordnance is authorized for use on NTTR. Several subranges and target complexes within NTTR provide monitoring and scoring for ordnance delivery and provide real-time scoring feedback to pilots. Therefore, NTTR meets this criterion of providing full instrumentation for F-35 weapons deployment.

7. ***Range Instrumentation System.*** NTTR provides extensive live monitoring, recording, and tracking instrumentation to support the full range of F-35 testing and training maneuvers. Using the Nellis Air Combat Tracking System (NACTS), the Range Control Center at Nellis AFB can track and monitor a single aircraft's entire mission or a multi-aircraft exercise. NACTS replaced the former Air Combat Maneuvering Instrumentation (ACMI) tracking and uses a system of aircraft transmitters and ground receivers which allows recording of all flight maneuvers for later replay and flight debriefings. The range instrumentation system available from Nellis AFB provides coverage for the NTTR airspace, offering real-time coverage or air-to-air and surface-to-air operations. For these reasons, NTTR and Nellis AFB meet this basing criterion.

8. ***Realistic Threats.*** NTTR offers sufficient threat realism and simulated threats to meet the basing criteria for the F-35 FDE program and WS. NTTR includes multiple electronic threat simulators and communications jamming equipment that defend 195 target complexes containing more than 2,000 simulated targets. These established electronic threats are used to train and test aircrews and weapons systems in a realistic battlespace environment. These threats simulate the full range of anticipated enemy air defenses, including radar units for target acquisition, surface-to-air missiles, and anti-aircraft artillery. This substantial array of equipment provides realistic threats for both testing and training operations. NTTR also permits the use of defensive countermeasures

in response to these realistic threats. Flares can be employed throughout most the NTTR airspace.

9. ***Training Exercises*.** Nellis AFB, along with NTTR, represents the Air Force's premier location to conduct complex, multi-aircraft combat training exercises. Nellis AFB conducts multiple large force exercises every year. These large force training exercises realistically simulate aircrew deployment, actual battlefield combat, and the intense tempo of air warfare. The FDE program and WS aircraft also participate in these exercises. In terms of the F-35, the opportunity to participate in these Nellis AFB programs would fulfill the basing requirement defined above.

2.1.5 Alternatives Considered But Not Carried Forward

In compliance with NEPA, as promulgated under CEQ regulations 40 CFR Part 1502.14, the Air Force must consider reasonable alternatives to the proposed action. The CEQ notes, however, that if a very large number of alternatives potentially exist, an agency must only analyze a reasonable number of examples. Determining what constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case. The CEQ regulations require a brief discussion of the reasons for eliminating alternatives not considered reasonable (40 CFR 1502.14). Furthermore, the AFI implementing NEPA (promulgated at 32 CFR 989.8(b)) defines "reasonable" alternatives as those that meet the underlying purpose and need for the proposed action and that would require a reasonable person to inquire further before choosing a particular course of action. To narrow the number of alternatives, the AFI allows eliminating alternatives from detailed analysis based on reasonable selection standards (e.g., operational, technical, or environmental standards suitable for a particular project). For this proposal, Sections 2.1.3 and 2.1.4 presented above address the selection standards. The following discussion briefly explains the reasons for eliminating alternatives from detailed study.

The purpose of the action discussed in this EIS is to implement both the F-35 FDE program and WS. To achieve that purpose, the Air Force must implement the FDE program and WS at a base that meets the specific and unique requirements of each program. Although many bases are capable of accommodating F-35 operational units, the FDE program and WS have requirements different from those needed for the operational units.

The F-35 FDE program and WS are best located at an ACC base to ensure command and control and to support ACC in meeting its responsibilities for the overall F-35 development and deployment process. This location would also be a MRTFB. Of the 65 bases within the Air Force, only one represents an ACC MRTFB installation: Nellis AFB, Nevada. Other bases, such as Edwards AFB, California, have an MRTFB, but are not under direct ACC command and control or do not meet other basing criteria.

DoD, the Air Force, and ACC also operate many bases and training ranges such as Goldwater Range, Arizona, McGregor Range New Mexico, and others. These other installations and ranges serve important functions to the DoD and, at some point, could support operational F-35s conducting training suited for their particular mission. However, these other bases and ranges currently have existing missions of critical need for the DoD and the Air Force. Addition of the F-35 FDE program and WS, along with the associated infrastructure and operations, would interfere with the primary missions of those bases and ranges.

For example, Edwards AFB and its Air Force Flight Test Center, serve as the primary location for flight testing new aircraft in their initial or developmental stages. The base offers infrastructure to support many individual types of test aircraft. Airspace and ranges associated with or nearby the base provide the assets and instrumentation needed for the specific type of aircraft testing performed at Edwards AFB. Although an important test center for the Air Force, Edwards AFB does not meet the specific and unique requirements for either the F-35 FDE program or the WS. It does not meet the overall considerations presented for these F-35 programs (refer to Section 2.1.2), since it does not offer an integrated battlespace environment. Placement of the F-35 programs at Edwards AFB would require major changes to base and training range infrastructure. Of the nine basing criteria listed in Section 2.1.3, Edwards AFB and associated assets fail to meet five. It is not an ACC base (criterion 1), it lacks the range instrumentation (criterion 7) and realistic threat environment (criterion 8) essential to the FDE program and WS, and it offers neither the ordnance delivery ranges (criterion 6) nor support for large-force training exercises (criterion 9).

Holloman AFB serves as another example of a vital base that would be inappropriate for the F-35 FDE program and WS. Holloman AFB has primarily supported operational aircraft (such as the F-117s and F-22As) in the past but is soon being re-structured to support F-16 formal training units. This base will not be structured for an operational unit, nor does it support an FDE program and WS. While supporting components of an MRTFB, only tests are conducted on nearby White Sands Missile Range. The missile range emphasizes ground-based engineering, as well as radar, missile, and aircraft testing.

While it represents a DoD center of excellence for these capabilities and supports an operational mission, Holloman AFB does not meet the specific and unique requirements for the F-35 FDE program and WS. At a minimum, it does not meet the considerations and criteria enumerated in Section 2.1.2 and 2.1.3 because it lacks the following elements: integrated battlespace environment (consideration 1), existing infrastructure for an FDE program (consideration 3), range instrumentation for tracking and providing feedback to numerous aircraft simultaneously (criterion 7), threat simulation for a realistic battlespace environment (criterion 5), and support for large-force training exercises involving a broad spectrum of aircraft and situations (criterion 9).

Of the 16 MRTFBs, only Nellis AFB and NTTR meet all F-35 FDE program and WS considerations and criteria. As noted above, Holloman AFB is an ACC base with an associated MRTFB. However, it fails to fulfill the criteria for basing the F-35 FDE program and WS. The other MRTFBs similarly lack the attributes required for basing (Table 2-3). Eight of the sixteen bases are controlled by the Army or Navy, not under the command of the Air Force. The remaining eight Air Force MRTFBs either do not meet the considerations presented in Section 2.1.2 or the criteria applied in Section 2.1.3. In addition, each would require far more changes to establish the F-35 FDE program and WS than would be needed at Nellis AFB and NTTR.

It is not possible to exactly quantify the costs to duplicate the existing infrastructure, airspace, and personnel for the FDE program and WS at an installation other than Nellis AFB and NTTR. Multiple actions would be needed at Edwards AFB and nearby training ranges to duplicate the FDE program and WS capabilities found at Nellis AFB. Similar changes would be needed to alter other bases to duplicate the capabilities at Nellis AFB and NTTR. A conservative list of these actions includes: enhanced electronic threats and targets; range instrumentation with tracking, scoring, and related teaching facilities; additional security and airspace modifications; and new or relocated personnel to perform comprehensive FDE program and WS functions. Also, extensive construction would be needed at Edwards AFB or other bases, resulting in additional costs of millions of dollars to duplicate the FDE program and WS capabilities currently available at Nellis AFB and NTTR.

Establishing the F-35 FDE program or WS at a base other than Nellis AFB or at a range other than NTTR might be possible, but it would not represent a reasonable alternative. Other bases would need to make changes to their infrastructure, organization, existing programs, and probably, reconfigure/create new airspace and ranges in order to meet the specific requirements of an F-35 FDE program and WS. Such changes would conflict with the overall basing consideration regarding minimizing change by employing existing assets. To provide the integrated battlespace environment and level of training exercises important to the FDE program and WS, the Air Force would need to make wholesale changes to the ranges and the exercises held there. Basing the F-35 FDE program and WS at a base other than Nellis AFB would require changes to that base, its organization, and its associated ranges and airspace. This would:

- require additional time to establish the FDE program and WS, further delaying the entire F-35 program and potentially diminishing national defense capabilities;
- substantially increase the costs of implementing the F-35 program beyond that allocated by Congress and approved by the President; and
- likely result in more extensive actions that could have effects on the environment greater than those potentially occurring from the proposed action.

The Air Force considered the possibility that the FDE could be established at a different base than the WS. But splitting the FDE program and the WS between two locations would not be an efficient or

effective use of existing available infrastructure, training assets, and personnel. Economies of maintenance, training, and personnel would be achieved by establishing both the F-35 FDE program and F-35 WS at the same base and using the same airspace to conduct needed flight operations. Further economies would accrue if a base selected for the F-35 FDE program and WS already supported such programs for other fighter aircraft. Separating the two programs at different bases would not achieve these economies and would represent an inefficient use of available resources.

Establishing the FDE and WS at two separate locations would also reduce the opportunity for the two programs to provide feedback to one another about the capabilities of the F-35 and the expansion of those capabilities for combat. Transitioning specific F-35 airframes from FDE to WS would be simpler if both programs resided at the same base. After considering the concept to duplicate the F-35 FDE program and WS at different bases, and the factors described above, the Air Force determined it would not be reasonable to separate the programs.

In summary, splitting the FDE program and WS between bases would not fulfill the basing criteria. It would eliminate the synergy achieved when both reside at a single base, and subsequently increase the costs and resources involved. This increase in cost and lengthening of the timeline to implement the beddown could delay the entire program, potentially diminishing national defense capabilities.

No location or combination of locations other than Nellis AFB would meet the specific requirements for basing the F-35 FDE program and WS. No reasonable action alternative to Nellis AFB exists, because none would fulfill the purpose and need for the proposal.

2.1.6 Alternatives Carried Forward for Analysis

As noted above, the Air Force and ACC's only existing fighter FDE program and WS are currently located at Nellis AFB, so it represents the location of the proposed action. Nellis AFB, its ranges, and its airspace provide the only basing location that meets the needs for both the F-35 FDE and WS programs. Therefore, two alternatives were carried forward for detailed analysis in this EIS, the no-action alternative and the proposed beddown of the F-35 at Nellis AFB. The no-action alternative is detailed in Section 2.2 and a description of the proposed action follows in Section 2.3.

2.2 NO-ACTION ALTERNATIVE

CEQ regulations (40 CFR Part 1502.14(d)) that implement NEPA require analysis of a no-action alternative. "No action" means that the proposed action (i.e., F-35 beddown at Nellis AFB) would not take place, and the resulting environmental effects from taking no action would be compared to the effects of implementing the proposed action. Under the no-action alternative for this EIS, no F-35 FDE program and WS beddown would occur at Nellis AFB and no on-base construction or personnel increases would be implemented, and the F-35 FDE program and WS would not use NTTR. The following descriptions of the current status of Nellis AFB and NTTR provide a context for comparing the changes that would occur with the proposed action.

2.2.1 Nellis AFB

The base, located in the southeast corner of the state of Nevada, lies adjacent to the city of North Las Vegas (Figure 2-1). Nellis AFB is the center for ACC training and testing activities conducted at NTTR, with the base providing logistical and organizational support for NTTR, the aircraft training, and personnel. Situated in Clark County, the base lies 5 miles northeast of the City of Las Vegas. The unincorporated town of Sunrise Manor and undeveloped portions of Clark County surround the majority of the base, although open space dominates to the northeast. Covering 14,161 acres, the base contains three major functional areas (Figure 2-2). Area I, the main base, is located east of Las Vegas Boulevard and includes the airfield and most base functions. Area II, the Munitions Storage Area (MSA)/Weapons Storage Area (WSA) lies northeast of the main base; Area III, located northwest of the main base, includes a number of facilities such as a hospital, storage, and housing. The areas north and east of Nellis AFB are primarily open range and mountains, with commercial and industrial uses along Las Vegas Boulevard. Directly south and southwest of the base, commercial and residential land uses mixed with some industrial activities dominate the area.

The mission of Nellis AFB is to provide realistic combat training involving every type of aircraft in the Air Force inventory. It also supports test and evaluation programs and weapons schools for all Air Force fighter aircraft: A-10s, F-15C/Ds, F-15Es, F-16Cs, and F-22As. The organizational structure of Nellis AFB includes four major wings and 60 other units. The USAFWC, headquartered at Nellis AFB, consists of five wings: three wings—the 57th Wing (57 WG), the 98th Range Wing (98 RANW), and the 99th Air Base Wing (99 ABW)—are based at Nellis AFB. The fourth and fifth, 53rd and 505th Wings, operate from Eglin AFB and Hurlburt AFB, respectively in Florida. Table 2-3 summarizes the major units and their functions. In addition, Nellis AFB and NTTR host and conduct large-force exercises for U.S. and allied air forces.

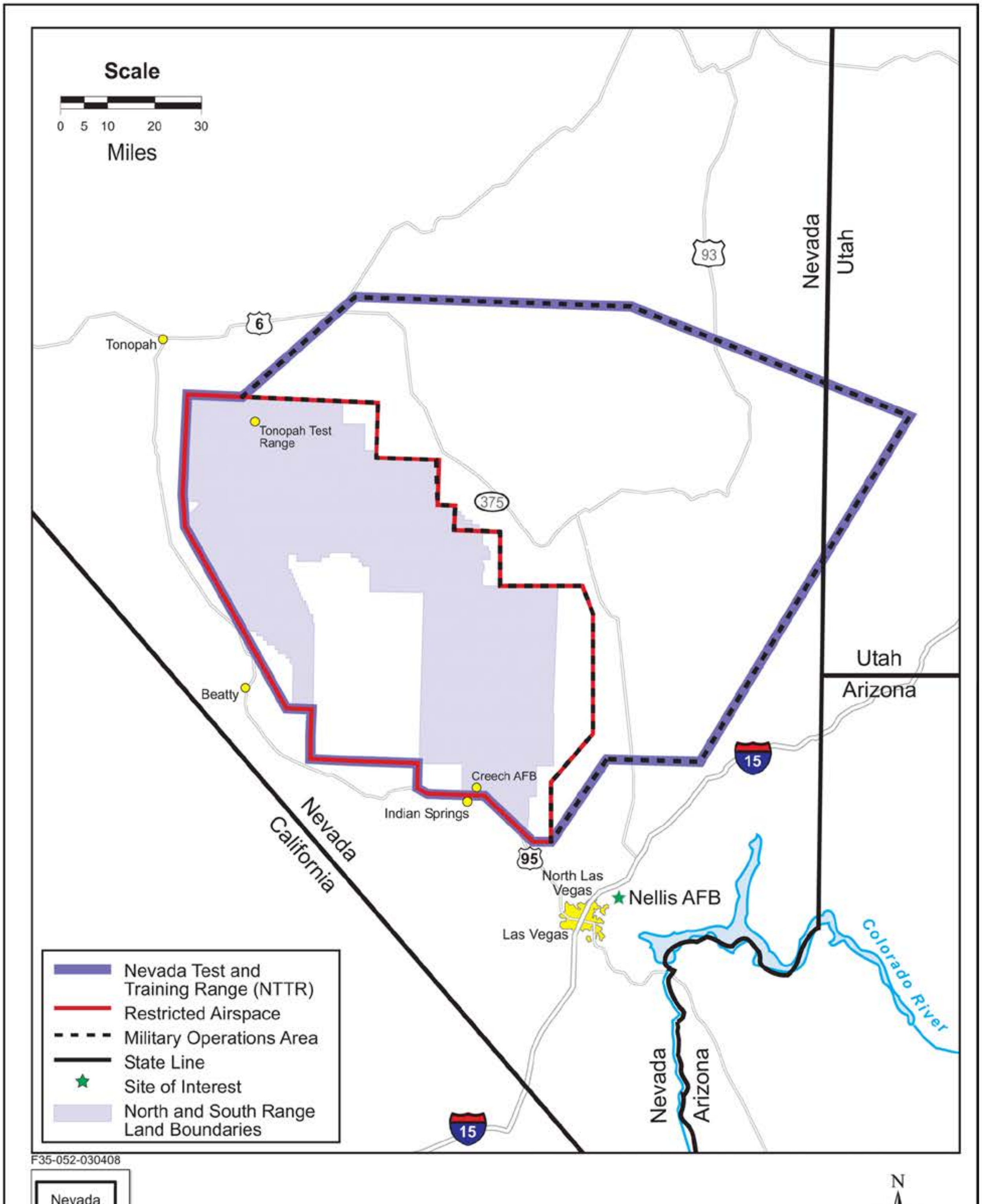


Figure 2-1 Nellis AFB and NTTR Location Map

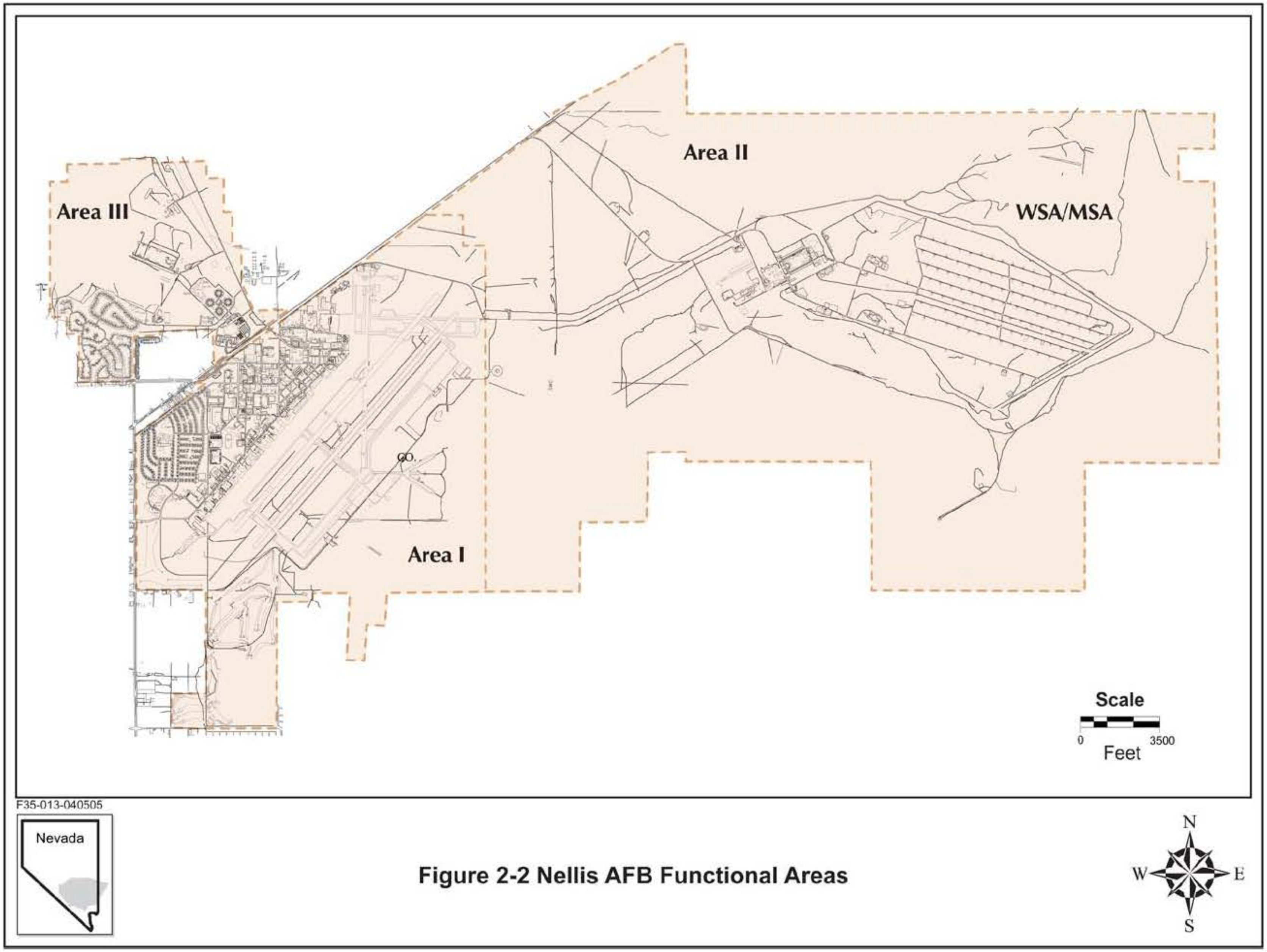


Figure 2-2 Nellis AFB Functional Areas

Table 2-3 Nellis AFB Units Relevant to the Proposed Action	
Unit	***Relevant Functions***
USAFWC	• Manages all advanced pilot training and integrates test and evaluation requirements. • Oversees flying operations at Nellis AFB: 57 WG, 98 RANW, and the 53 WG.
57th Wing Weapons School 414th Combat Training Squadron (Red Flag)	• Oversees all flying operations at Nellis AFB including the Weapons School and 414th Combat Training Squadron. • Manages airspace. • Ensures realistic training in combined air, ground, and electronic threat environment. • Provides an advanced combat training course in weapons and tactics. • Trains graduate-level fighter aircrews for all fighter aircraft. • Conducts large-force exercises involving combat training for multiple "friendly" and "adversary" forces.
53rd Wing 422nd Test and Evaluation Squadron	• Based at Eglin AFB except for the 422nd Test and Evaluation Squadron. • Responsible for operational testing and evaluation of new equipment and systems proposed for use by the forces. • Develops new tactics for aircraft in the Air Force inventory. • Operates A-10, F-15C, F-15E, F-16C, F-22A, and HH-60G aircraft.
98th Range Wing	• Operates, maintains, and develops NTTR comprising about 3 million acres of land and 12,000 square nm of airspace. • Operates airfields at Creech AFB and the Tonopah Test Range.
99th Air Base Wing	• Host wing for Nellis AFB. • Oversees all day-to-day operations and functions of the base.

The 414th Combat Training Squadron conducts large-force exercises that maximize the combat readiness and survivability of participants by providing a realistic training environment. Red Flag is a special multi-week large force exercise that realistically simulates aircrew deployment and combat situations. Red Flags are complex, full-scale simulated wars, complete with aggressor aircraft using adversary tactics. These exercises teach units how to deploy and operate in an integrated manner. In a typical Red Flag exercise, Blue Forces (friendly) engage Red Forces (aggressor) in combat situations. Blue Forces are made up of units from ACC, Air Mobility Command, U.S. Air Forces Europe, Pacific Air Forces, Air National Guard, Air Force Reserve Command, Army, Navy, Marine Corps, and allied air forces. They are led by a Blue Forces commander who orchestrates the employment plan. Red Forces are composed of Red Flag's Adversary Tactics Division and provide the threats through the emulation of enemy tactics. In a typical year, the Air Force plans three to five Red Flag exercises at Nellis AFB and NTTR.

Nellis AFB Assigned Aircraft and Airfield Operations

Under the no-action alternative, the number and nature of aircraft assigned to Nellis AFB and the quantity and type of airfield operations would remain unchanged from the baseline conditions described below. Table 2-4 lists the aircraft force structure currently stationed at Nellis AFB. Since Nellis AFB supports major force exercises such as Red Flag, more than a dozen types of transient (visitors not based at Nellis

AFB) aircraft temporarily operate from the base during exercises. These aircraft range from American B-1B bombers to fighters such as the Mirage 2000 and Tornado, operated by U.S. allies. Table 2-5 summarizes the principal operational tasks of the major types of aircraft that are stationed at Nellis AFB, use the base as transients, or operate within NTTR. Other aircraft at Nellis AFB are minor transient users and are not listed.

Table 2-4 Aircraft Assigned to Nellis AFB

Aircraft Type	*HH-60*[1]	*A-10*	*F-15C*	*F-15E*	*F-16*[2]	*F-22A/T*[3]	*Total*
Number of Aircraft	11	10	19	11	45	17	113

[1] Helicopter.
[2] Includes FDE/WS (26); Thunderbird Demonstration Team (8); and Aggressors Squadron (11).
[3] Includes all F-22A aircraft authorized for basing at Nellis AFB as well as visiting or transient (T) aircraft.
Source: Air Force 2004a.

Table 2-5 Major Types of Aircraft Operating at Nellis AFB and in NTTR

Aircraft Type	*Status*	*Description*
A-10 and OA-10 Thunderbolt II	B/T	Low altitude, heavily protected aircraft designed to defeat armored vehicles and act as forward air controller
AV-8B Harrier	T	Close support attack aircraft used by the Marine Corps; has short takeoff and vertical landing capabilities
B-1B Lancer	T	Long range, high and low altitude bomber performing deep interdiction strikes
B-2 Spirit	T	Long range, high and low altitude bomber performing deep interdiction strikes with stealth technology
B-52H Stratofortress	T	Long range, high and low altitude bomber performing deep interdiction strikes
C-130 Hercules	T	Four-engine turboprop troop and cargo transport
C-17A Globemaster	T	Long range, heavy lift cargo transport
E-3 Sentry	T	Airborne Warning and Control System (AWACS) capable of high- or low-level surveillance of air vehicles over all types of terrain
E-8C Joint STARS	T	Multi-engine aircraft modified with a side-looking radar for ground surveillance, targeting, and battle management missions
EA-6B Prowler	T	Navy all weather, electronic warfare aircraft capable of detecting, locating, jamming, and destroying enemy air defense radar; now employed by the Air Force to replace the EF-111
F/A-18C/D Hornet	T	U.S. Navy, Marine Corps, and Canadian Air Force twin-engine, multi-mission tactical air-to-air and air-to-ground fighter aircraft
F-15C Eagle	B/T	Performs air-to-air combat and air intercept operations; no surface attack missions
F-15E Strike Eagle	B/T	Air-to-ground fighter with air-to-air capability
F-16C/D Fighting Falcon	B/T	Multi-role fighter performing close air support, air-to-air combat, interdiction strikes, and suppression of enemy air defenses
F-22A Raptor	B	Air-to-air combat and intercept missions and air-to-ground missions with stealth technology
HH-60G Pave Hawk	B	Combat search and rescue helicopter designed for long range, rapid response missions
KC-135R, KC-10A	T	High-altitude aerial refueling aircraft to support varied aircraft missions
Mirage 2000	T	High performance delta-winged fighter/bomber used by foreign air forces
Unmanned Aerial Systems (UAS)	B*	UAS providing long endurance, unmanned aerial reconnaissance, surveillance, and target acquisition

Table 2-5 Major Types of Aircraft Operating at Nellis AFB and in NTTR		
Aircraft Type	***Status***	***Description***
RC-135 Rivet Joint	T	Surveillance aircraft equipped with sophisticated intelligence gathering devices for monitoring enemy electronic activity

Notes: B = Based, T = Transient for exercises, B*= Based at Creech AFB

The Nellis AFB airfield airspace environment comprises part of the Class B airspace that the Federal Aviation Administration (FAA) designates around the nation's busiest airports. Designed for air traffic operating under instrument flight rules, Class B airspace for Nellis AFB extends around Nellis AFB and Las Vegas' McCarran Airport. Class B airspace requires that all aircraft operating within the area be in contact with the controlling air traffic control facility. Nellis AFB operates two parallel runways extending northeast-southwest (refer to Area I, Figure 2-1). Section 3.2 provides more information regarding Class B airspace and operations.

This document uses three terms to describe different aircraft flying activities: *sortie, airfield operation,* and *sortie-operation*. Each has a distinct meaning and commonly applies to a specific set of activities in particular airspace units. A *sortie* consists of a single military aircraft from takeoff through landing. For this EIS, the term sortie is commonly used when summarizing an amount of flight activity from Nellis AFB. In contrast, an *airfield operation* represents the single movement or individual portion of a flight in the base airfield airspace environment such as one takeoff, one landing, or one transit of the airport traffic area. A single sortie generates at least two airfield operations (takeoff and landing), and a sortie can result in more than one *sortie-operation* at NTTR. A *sortie-operation* comprises the use of one airspace unit (e.g., MOA, Restricted Area) within NTTR by one aircraft. Sortie-operation applies to flight activities outside the airfield airspace environment. Each time a single aircraft conducting a sortie flies in a different airspace unit, one sortie-operation is counted for that unit.

From 1987 through 1994, annual airfield operations at Nellis AFB have varied between 61,000 and 181,000 (Air Force 1999b) as a result of budget constraints, aircraft realignments, and changes in the number, composition, and duration of the exercises conducted at Nellis AFB. In 2003 aircraft conducted approximately 86,000 airfield operations (Air Force 2004c). For these same reasons, Table 2-6 presents the baseline annual airfield operations at Nellis AFB according to based versus transient aircraft and day or night operations.

Table 2-6 Annual Airfield Operations at Nellis AFB			
Aircraft Type	***Annual Airfield Operations***		***Total***
	Day *(7:00 a.m. - 10:00 pm)*	*Night* *(10:00 p.m. - 7:00 a.m.)*	
Aircraft Based at Nellis AFB[1]	56,401	6,073	62,474
Transient Aircraft	23,155	0	23,155
Total	**79,556**	**6,073**	**85,629**

Source: Air Force 2004c.
Note: [1]Includes authorized F-22A operations.

Facilities and Infrastructure

Nellis AFB includes a well-developed infrastructure supporting a broad spectrum of functions and organizations. Covering 14,161 acres, the base consists of three functional areas (refer to Section 2.2.1 and Figure 2-2). There are more than 2,000 buildings in the Nellis AFB inventory. Area I, the main base, occupies about 30 percent of the base and contains runways, flightline, industrial facilities, housing, and administrative and support facilities. Area II, supporting the MSA/WSA, Rapid Engineers Deployable Heavy Operational Repair Squadron Engineer (REDHORSE) Reserve Squadron, and Munitions Squadron, covers approximately 59 percent of the base. Area III covers about 11 percent of the base and includes Manch Manor housing, the hospital, temporary lodging facilities, Family Camp, and an industrial area. Under the no-action alternative, no change to this existing infrastructure would occur.

Personnel

No increase of personnel would occur under the no-action alternative. Estimated personnel levels at Nellis AFB would remain unchanged from the present, as shown in Table 2-7. However, Nellis AFB is a vital and active installation constantly changing and refining missions and organizations. This dynamism results in fluctuations of personnel levels within a year and year-to-year. Variations of a few hundred personnel occur consistently, and Nellis AFB absorbs and adjusts to them.

Table 2-7 Nellis AFB Personnel

	Military	***Civilian and Contract Employees***	***Total***
Nellis AFB Personnel	8,615	3,669	12,284

Source: (Air Force 2006a).

2.2.2 Nevada Test and Training Range

The NTTR refers to the land withdrawn for the range and its associated military training airspace. The NTTR airspace covers approximately 12,000 square nm. Two airfields, Creech AFB and Tonopah Test Range, lie within NTTR and support the activities performed within the complex. In addition, the range includes the Tolicha Peak Electronic Combat Range.

In 1999, a Legislative EIS was prepared to renew the NTTR land withdrawal. Public Law 106-65, the Military Lands Withdrawal Act of 1999, extended the land withdrawal until 2021 and supersedes any former land withdrawals (Air Force 1999b). NTTR withdrawn land consists of two main functional areas, the North Range and South Range, both of which accommodate the delivery of live and inert ordnance as well as electronic combat operations (Figure 2-3). The North Range contains four unmanned weapons delivery complexes and multiple and dispersed facilities supporting three Electronic Combat Ranges: Tonopah Electronic Combat Range, Tolicha Peak Electronic Combat Range, and Electronic Combat South Range. These ranges provide a spectrum of high-to-low electronic threat environments.

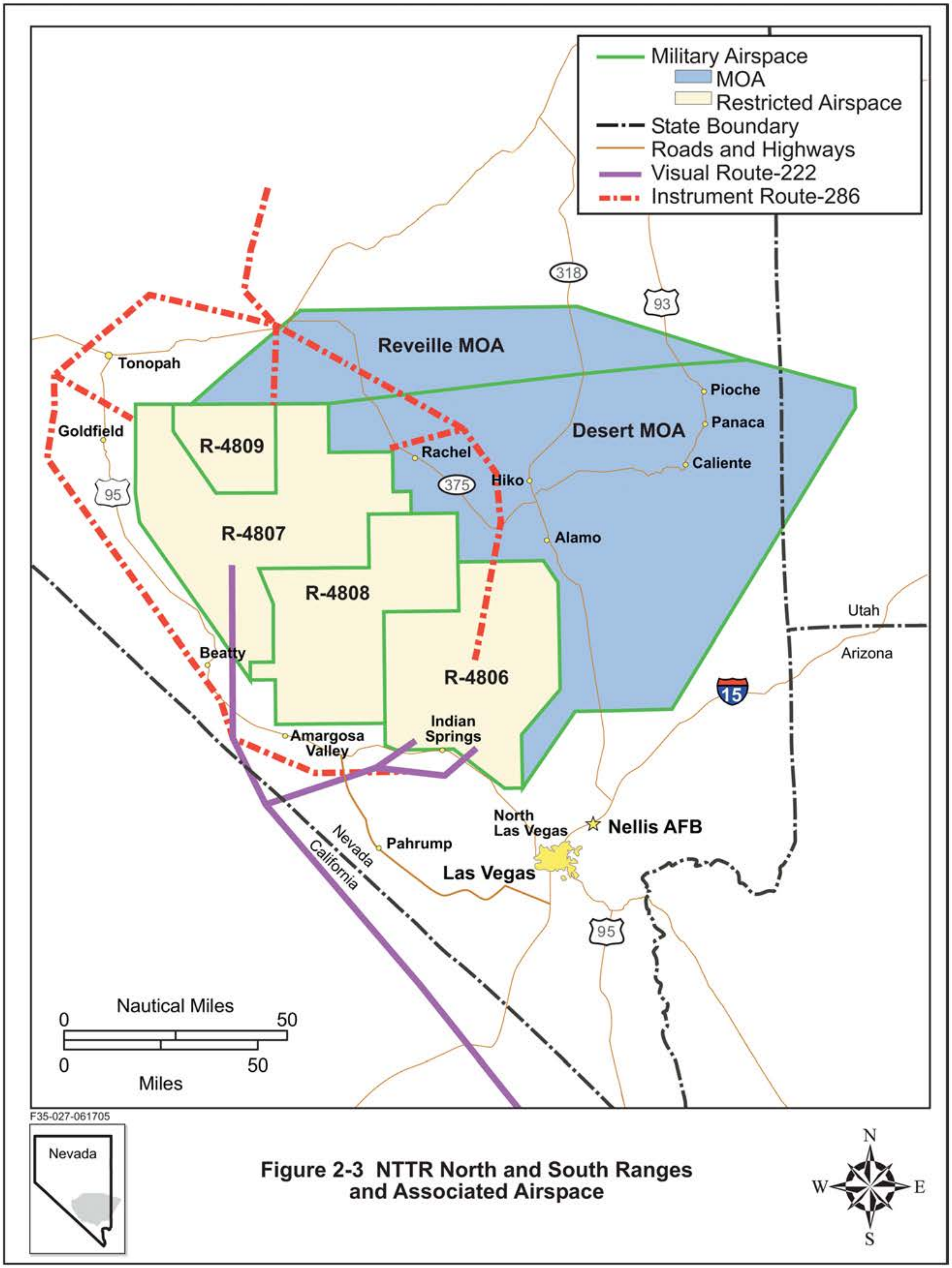


Figure 2-3 NTTR North and South Ranges and Associated Airspace

The South Range contains five weapons delivery areas consisting of two manned weapons delivery complexes and three unmanned complexes. The South Range overlaps a portion of the Desert National Wildlife Range (DNWR), an area established in 1936 for the protection and preservation of desert bighorn sheep. Through mutual and collaborative efforts, the Air Force and the U.S. Fish and Wildlife Service (USFWS) work to maintain proper management of the DNWR land areas that coincide with NTTR.

To improve target complex realism, NTTR enhances targets with actual or simulated military assets including a tank battlefront, truck convoys, airfields, industrial complexes, surface-to-air missile sites, and a railroad complete with marshaling yards. Many of these target complexes are "defended" by electronic threat simulators providing a realistic arena for operational testing of weapons systems, tactics, and combat readiness. Threat simulators mirror electronically and, in many cases, visually resemble equipment likely to be encountered in actual combat. Radar units simulate early warning, ground control intercept, target acquisition, and surface-to-air and anti-aircraft artillery defenses and guidance.

NTTR ground equipment includes multiple radar and communications jamming equipment designed to test and improve the quality of aircrew combat training. Many of the threat simulators also support instruments to collect data useful in evaluating and scoring surface-to-air engagements.

The Air Force deploys extensive monitoring and tracking equipment throughout NTTR to support testing and training. Data collected on the range and in the associated airspace are processed by computers located in the Range Control Center at Nellis AFB which can track a multi-force engagement (up to 100 aircraft simultaneously) or a single aircraft's entire mission.

NTTR supports realistic training by permitting the use of ordnance, both live and inert. Aircrews must be skilled in the use of the full range of conventional Air Force weapons, from unguided ordnance and laser-guided bombs to air-to-ground missiles. NTTR provides for safe training, testing, and evaluation of weapons systems in support of potential technological improvements in hardware, software, tactics, and training. In recent years, the total amount of ordnance used annually on NTTR has varied, with a high of 4,500 tons and a low of 3,000 tons (Air Force 1999b). Inert (i.e., non-explosive) ordnance represents slightly more than 50 percent of the ordnance expended on NTTR. Since ordnance use does not directly correlate to the number of sortie-operations flown in NTTR, the amount of ordnance tends to vary year-to-year and would continue to do so under the no-action alternative. NTTR provides the capability to use an extensive inventory of conventional live and inert training ordnance including a wide range of air-to-ground weapons: so-called "iron" (unguided) bombs, cluster bombs, rockets, cannon, and guided bombs and missiles.

Inert training ordnance includes no high explosives and commonly consists of a small steel projectile or steel-encased concrete projectile. Constructed to function like actual munitions, inert ordnance vary in

weight from about 10 pounds to 2,000 pounds. Some inert ordnance contain a small spotting charge that generates a puff of smoke to aid in scoring weapons delivery. Live ordnance, as the designation indicates, includes high explosive charges. Live ordnance used in training and testing at NTTR is identical to that used in actual combat. Live ordnance includes cluster bomb units to general purpose bombs weighing 2,000 pounds and containing almost 1,200 pounds of high explosive. Air-to-ground missiles (AGM), such as the AGM-65 Maverick (300-pound explosive warhead) and 2.75 inch rockets are also used on authorized targets at NTTR. While air-to-air missile training occurs at the range, safety rules require the missiles remain fixed to the aircraft. No actual launching of air-to-air missiles is permitted over NTTR.

Public protection is ensured at NTTR by excluding the public and non-required military personnel from locations simulating an active, high-stress battlefield environment. Air Force control of NTTR enables flight and ground operations to train and test equipment for the defense of national security interests while minimizing risks to the public. The Air Force uses Operational Risk Management for making decisions that promote safe operations. These management procedures produce standards to protect the public, military personnel, and equipment from ordnance impacts.

All firing or release of weapons must be conducted in a manner that ensures impact within the assigned hazard area. For air-to-ground missiles and free-fall guided weapons, the land area and airspace must be large enough to contain the entire flight envelope of the weapon from launch/release to impact. Weapons safety buffers are developed for all aircraft, weapons, and delivery systems employed in training/testing. Safety buffers for all weapons encompass the target area and several miles on either side of the target. As the largest exclusive-use, land-based range in the continental United States, NTTR can accommodate existing and projected future weapons safety buffers.

Electronic threat emitters are deployed throughout the range. Some established threat systems are mobile to decrease redundancy and aircrews becoming accustomed to these emitter sites. Ground-launched simulated threats, such as simulated Smokey surface-to-air missiles (SAMs) are also placed on the range.

Isolation of hazardous materials and dangerous operations from the public and untrained military personnel provides the greatest safety margin at NTTR. Each weapon system is evaluated for hazards associated with operations, maintenance, and military capability. Operational rules, regulations, and practices minimize the chance of personnel injuries.

Airspace Structure

NTTR includes restricted airspace that overlies the military lands and is adjacent to the MOA airspace. The restricted areas comprise special use airspace within which the FAA has determined that potentially hazardous activities occur, including air-to-ground ordnance delivery. Regulations prohibit nonparticipating military and civil/commercial aircraft from flying within this airspace without

authorization. Training activities within NTTR predominantly involve subsonic flight but supersonic flight is authorized in all NTTR airspace units, although at differing altitudes (Table 2-8 and Figure 2-4). Under the no-action alternative, the structure, function, and use of NTTR would not change. Variation in the amount of use would likely occur, but it would remain within the range of variability noted over the past decade or more.

Table 2-8 Charted Airspace Associated with NTTR

Airspace Unit	*Floor (lower) Altitude*	*Ceiling (upper) Altitude*	*Supersonic Flight Authorized*
Reveille MOA	100 feet AGL	17,999 feet MSL	Above 5,000 feet AGL
Desert MOA	100 feet AGL	17,999 feet MSL	Portions above 5,000 feet AGL and rest of the MOA above 30,000 feet MSL
Restricted Area R-4806	100 feet AGL	Unlimited	East side above 5,000 feet AGL and rest of area above 30,000 feet MSL
Restricted Area R-4807	Surface	Unlimited	Portions above 100 feet AGL; portions above 5,000 feet AGL; and rest of area above 30,000 feet MSL
Restricted Area R-4809	Surface	Unlimited	Above 5,000 feet AGL, with authorization
Restricted Area R-4808[1]	Surface	Unlimited	Above 14,000 feet MSL

[1] Department of Energy (DOE) airspace over the Nevada Test Site (NTS); it is not part of NTTR but its western portion is used by NTTR aircraft to transit to and from the North Range.

The NTTR airspace consists of Restricted Areas R-4806, R-4807, R-4808, and R-4809 and the Desert and Reveille MOAs with overlying ATCAA. The Tonopah Test Range underlies a portion of Restricted Area R-4809. R-4808 lies adjacent to the NTTR airspace and is controlled by the DOE for NTS activities. Through joint management with the DOE, and a cooperative and collaborative scheduling process, NTTR aircraft can transit this restricted airspace for entering and exiting NTTR North Range. Currently, NTTR and DOE are coordinating changes to the management and use of R-4808 to ensure continuation of R-4808 for its intended purpose and protection of surrounding airspace uses.

MOAs associated with NTTR include Reveille and Desert. MOAs consist of special use airspace that provide substantial vertical and horizontal maneuvering room for military aircraft training, and separate that training from other air traffic. MOAs also identify areas where concentrated military aircraft operations may occur. When a MOA is active, the FAA normally routes instrument flight rules traffic around it. In contrast, nonparticipating military and civil aircraft operating under visual flight rules may enter an active MOA by employing see-and-avoid procedures.

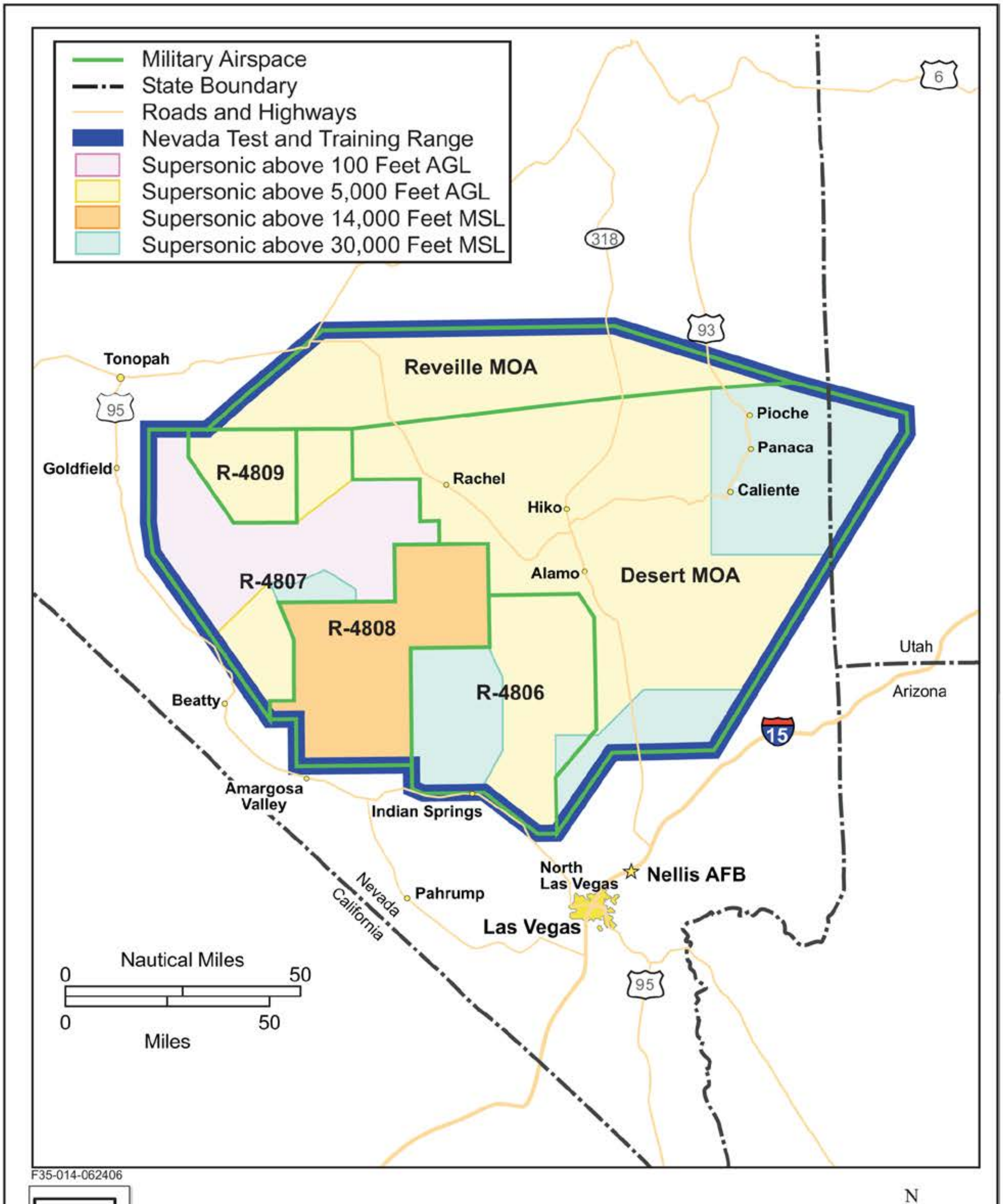


Figure 2-4
Nevada Test and Training Range
Supersonic Authorized Airspace

ATCAA overlies both MOAs, extending from 18,000 feet MSL to an altitude assigned by the FAA. ATCAA provides additional maneuvering airspace for training, and the FAA assigns it on an as-needed basis. Since federal rulings limit the ceiling of MOAs to altitudes up to, but not including 18,000 feet MSL, an ATCAA provides additional airspace from 18,000 feet MSL to whatever higher altitudes are needed to accommodate the flight training requirements. ATCAAs are only activated for use while scheduled aircraft operations are being conducted within the higher altitudes above the MOAs.

Authorized Supersonic Flight Areas

Because air combat requires varied speeds as a tactic, the NTTR airspace offers the opportunity to conduct supersonic flight. All NTTR airspace units (to some extent) are authorized for supersonic flight activities, including the Desert and Reveille MOAs overlying ATCAA (refer to Figure 2-3). Within authorized airspace, supersonic flight activities primarily occur during air-to-air combat and to a lesser degree during evasive maneuvers in response to ground threats or adversary aircraft. Not all aircraft using NTTR conduct supersonic flight. For aircraft capable of supersonic speed, supersonic flight occurs between 3 and 10 percent of the time during air-to-air combat on a typical training flight. The F-16, the aircraft most similar to the F-35 in terms of function and structure (i.e., single engine), conducts supersonic flight about 10 percent of the time during air-to-air combat.

NTTR and Associated Airspace Use

More than 20 different types of aircraft conduct testing or training within NTTR (refer to Table 2-5). Aircraft stationed at Nellis AFB, such as F-15s, F-16s, and F-22As form the predominant aircraft using the complex. Aircraft from other services (e.g., Navy F/A-18s) and U.S. allies also conduct operations in NTTR. The capabilities available at NTTR are in extremely high demand. Annually, the Air Force expends over 45 percent of its total training ordnance at NTTR for testing tactics and training missions. With an average of three to five major exercises planned each year, NTTR represents a major training asset, ensuring aircrew and aircraft readiness. For example, most of the U.S. and some of the Coalition aircrews received their first “combat” missions at NTTR’s simulated battlespace before fighting in the most recent conflicts in Afghanistan and Iraq.

Annual military use of NTTR varies, depending on many factors. These factors include Congressional funding levels, weapons testing requirements, aircrew training requirements, scheduling conflicts, deployments, and the actions of potential enemies that may pose a threat to the security interests of the United States or our allies. Due to these year-to-year variations in use, and the expectation that they will continue, the Air Force previously conducted a comprehensive review of NTTR aircraft sortie-operations (Air Force 1999b).

Since the NTTR airspace includes several MOAs, restricted areas, and subdivisions, sorties at NTTR commonly result in multiple sortie-operations, particularly during major exercises. For example, during an average sortie an F-16 from Nellis AFB uses six different airspace units, totaling six sortie-operations. Figure 2-5 shows representative patterns of aircraft operations within NTTR; each of these patterns flies through multiple airspace units, resulting in multiple sortie-operations.

Previous review of NTTR sortie-operations established a low-to-high range for annual sortie-operations in order to account for year-to-year variations in use (Air Force 1999b). For a low-use year, a total of 200,000 sortie-operations occur in the NTTR airspace, whereas a total of 300,000 sortie-operations represents a high-use year. Table 2-9 presents sortie-operations by airspace unit for low-use and high-use years. The Air Force anticipates that sortie-operations in the NTTR airspace under the no-action alternative would continue to range between 200,000 and 300,000 per year in the foreseeable future.

Table 2-9 Baseline Sortie-Operations by Airspace Unit

Airspace Unit	*Low Use - 200,000 Annual Sortie-Operations*	*High Use - 300,000 annual Sortie-Operations*
Desert MOA	51,224	76,170
Reveille MOA	14,038	20,911
R-4806	30,134	44,135
R-4807	74,128	112,121
R-4808	12,952	20,008
R-4809	17,524	26,655
Total	**200,000**	**300,000**

Flare Use

As with ordnance, flare use in NTTR varies from year to year, depending upon the nature of testing and training performed. Under the no-action alternative, flare use would be approximately 250,000 units per year. The effectiveness of flares in combat requires training and frequent use by aircrews to master the timing of deployment and the capabilities of the devices, and to ensure safe and efficient handling by ground crews.

Flares form the principal defensive mechanisms dispensed from military aircraft to avoid detection or attack by adversary air defense systems. Flares provide high-temperature heat sources ejected from aircraft that mislead heat-sensitive or heat-seeking targeting systems. Flares are used to keep aircraft from being targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft. Section 3.5 provides additional discussion on the composition and attributes of flares.

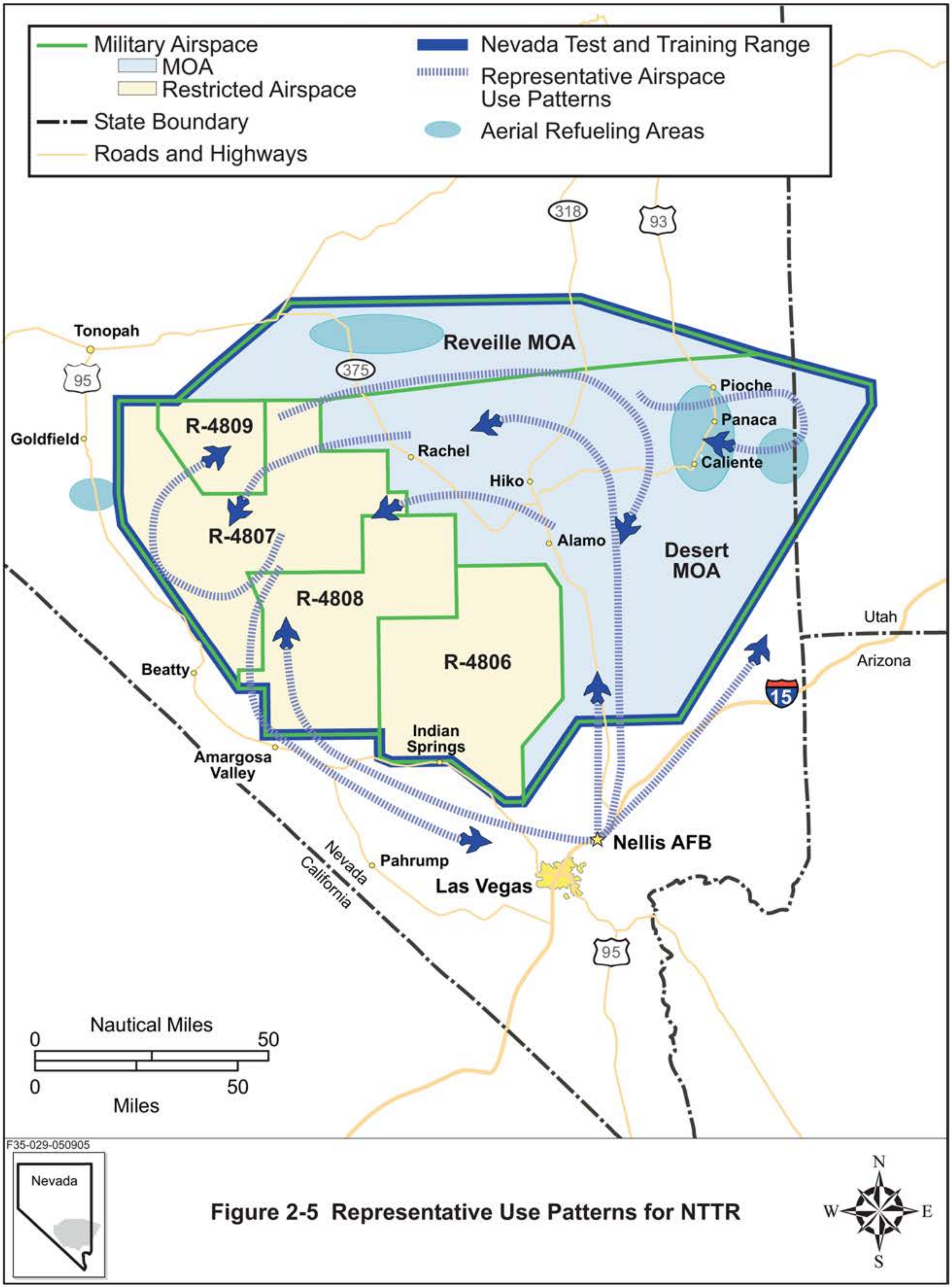


Figure 2-5 Representative Use Patterns for NTTR

Flares are also used throughout many portions of NTTR. Their use is controlled in accordance with standard operating procedures detailed in AFI 13-212, Volume 1, Nellis AFB Addendum A (Air Force 2007a). Periodically, restrictions will be published regarding the use of flares. Reasons may include extreme ground fire hazards, threats to ground property, high personnel injury potential, and Air Traffic Control radar interference.

2.3 PROPOSED ACTION

The Air Force proposes to base 36 F-35 fighter aircraft at Nellis AFB between 2012 and 2020. The aircraft would be assigned to the FDE program and WS at Nellis AFB. Flight activities would occur at Nellis AFB and NTTR. Table 2-10 presents the major milestones of the aircraft beddown schedule.

Table 2-10 Proposed Aircraft Inventory Change Schedule

Aircraft	***Baseline***	***2012***	***2015***	***2017***	***2018***	***2019***	***2020***
F-35 (FDE)	0	+4	+2 (6)	6	+6 (12)	12	12
F-35 (WS)	0	0	+1	+6 (7)	+9 (16)	+4 (20)	+4 (24)
Total F-35	**0**	**4**	**11**	**13**	**28**	**32**	**36**
Nellis AFB Based Aircraft*	113	113	113	113	113	113	113
Total	**113**	**119**	**124**	**126**	**141**	**145**	**149**

* Nellis AFB assigned aircraft include HH-60, A-10, F-15C, F-15E, F-16, and F-22A.

2.3.1 Nellis AFB

Proposed Beddown of the F-35

The Air Force proposes to establish an F-35 Division of the 422nd Test and Evaluation Squadron at Nellis AFB and an F-35 Division of the Air Force WS. The beddown of 36 F-35s is estimated to occur from 2012 through 2020. As of March 2011, the Air Force anticipates that the first four F-35s would arrive for FDE program beddown in 2012; in 2015 F-35s would begin to arrive to support the WS beddown. These aircraft would remain at Nellis AFB into the foreseeable future since the requirements for the FDE program and WS remain as long as the Air Force retains the F-35. The overall inventory of aircraft based at Nellis AFB (refer to Table 2-4) would remain unchanged with the exception of adding 36 F-35 aircraft; Nellis AFB, however, would experience a peak of up to 149 aircraft in 2020.

Proposed Nellis AFB Airfield Operations

By 2020, the 36 F-35s would conduct approximately 17,280 annual airfield operations. Table 2-11 presents details regarding the total airfield operations that would occur at the completion of the F-35 beddown when the Nellis AFB aircraft inventory would be at its peak.

Table 2-11 Projected F-35 Airfield Operations at Nellis AFB During Peak Year 2020			
Details of Airfield Operations	***Baseline Nellis AFB Airfield Operations***	***Proposed F-35 Airfield Operations***	***Total With F-35***
Day (7:00 a.m. to 10:00 p.m.)	79,556	16,174	95,730
Night (10:00 p.m. to 7:00 a.m.)	6,073	1,106	7,179
Total	**85,629**	**17,280**	**102,909**

*An *airfield operation* represents the single movement or individual portion of a flight in the base airfield airspace environment such as one takeoff, one landing, or one transit of the airport traffic area.

At the peak year, approximately 93 percent of the total airfield operations would occur during the day (7:00 a.m. - 10:00 p.m.) as defined for the purposes of environmental analysis. Additional F-35 airfield operations would result in a 20 percent increase in overall day operations at the base and an 18 percent increase in the overall night (10:00 p.m. - 7:00 a.m.) operations after completion of the F-35 beddown in 2020. Existing standard departure and arrival routes would be used by the F-35. Approximately 53 percent of the flying missions would involve a northeast departure, with the aircraft following existing tracks to the north for entry into NTTR. Approximately 47 percent of the flights would involve a southwest departure and follow existing tracks to the north into NTTR.

Proposed Facilities and Infrastructure Construction and Modification

The proposed F-35 beddown would require construction of new facilities, and alteration and demolition of existing facilities. The Air Force identified five primary areas (A, B, C, D, and MSA) of facility and infrastructure construction and modification (Figure 2-6). Currently, numerous projects have been identified which would occur in Areas A, B, and C located on the southeastern side (or primary side) of the flightline. Several projects would occur in Area D (eastern side of runways) with additional projects in the MSA. Table 2-12 summarizes the anticipated construction, demolition, and renovation to support the proposed F-35 beddown at Nellis AFB. It also presents the anticipated sequence of infrastructure changes over the period from 2011 through 2014. Since publication of the 2008 Draft EIS, four projects have been removed from the proposed action: FY09 airfield pavement, FY10 munitions igloo, FY11 airfield pavement, and FY13 munitions igloo. Other project changes include sliding the construction start dates and addition of seven new facilities (highlighted in gray). While the list below reflects proposed construction/demolition as of March 2011, it is anticipated that these projects may be changed, start dates moved, or additional projects identified as the beddown progresses. If this occurs, the appropriate NEPA documentation will be undertaken to assess potential impacts.

Table 2-12 Proposed Construction and Demolition Actions for the F-35 Beddown				
Project	***Area (square feet)***	***Base Area***	***Start Date Year***	***Demolish Building #***
A-10 Thunder Aircraft Maintenance Unit (AMU)	11,000	B	**FY11**	
6-Bay F-35 Hangar/AMU	80,988	B	**FY11**	265, 268, 269
Aircraft Washrack Addition, 1-bay to Building 271	9,551	B	**FY11**	
B10425 Munitions Facility Addition at Building 10425	3,000	MSA	**FY11**	
25-mm Munitions Storage Facility Addition at M81	3,000	MSA	**FY11**	
Munitions Trailer Facility	10,000	MSA	**FY11**	
2 MSA Loading Docks	1,000	MSA	**FY11**	

Table 2-12 Proposed Construction and Demolition Actions for the F-35 Beddown

Project	*Area (square feet)*	*Base Area*	*Start Date Year*	*Demolish Building #*
Precision-Guided Missile Bay Addition at Building 10439	3,000	MSA	**FY11**	
Parking/landscape areas	15,656	B	**FY11**	
Flight Test Instrumentation Facility	4,650	B	**FY11**	
422 Test Evaluation Squadron Operations Facility	20,300	B	**FY11**	
Flight Simulator Facility	20,000	B	**FY11**	
FY11 Subtotal	***182,145***			
Aerospace Ground Equipment (AGE) Complex	45,000	A	**FY12**	
Engine Shop Addition	9,000	C	**FY12**	
53 WG Test Squadron Operations Building	20,000	C	**FY12**	
FY12 Subtotal	***74,000***			
Parking/landscape areas	190,301	B	**FY13**	
Weapons School Addition at Building 282	10,000	B	**FY13**	
Alternate Mission Equipment Storage Facility	25,285	A	**FY13**	
Fuel Cell Hangar Addition	16,300	B	**FY13**	
Munitions Maintenance Facility Addition	6,000	MSA	**FY13**	
FY13 Subtotal	***247,886***			
Weapons Release Building	15,000	B	**FY14**	441
Parts Store	40,000	B	**FY14**	413, 415
East Ramp/Airfield Pavement	495,140	D	**FY14**	
Live Ordnance Loading Area (LOLA) Expansion	167,322	D	**FY14**	
Bomb Build-Up Pad	30,000	MSA	**FY14**	
Low Observables (L/O) Composite Addition	11,018	B	**FY14**	
4-Bay F-35 Hangar/Strike AMU	31,000	B	**FY14**	258
L/O Corrosion/Wash 3-Bay Hangar	15,800	B	**FY14**	250
Parking/landscape areas	96,486	B	**FY14**	
Fuel Cell Hangar	50,250	B	**FY14**	
FY14 Subtotal	***952,016***			
Total	**1,572,829**			

The majority of facilities would be completed before the aircraft beddown began to ensure availability of needed support functions for the F-35. Utility infrastructure upgrades would occur within the footprints of existing communication, energy, and water lines. The majority of construction, demolition, and renovation actions would occur along the flightline in Areas B and C. An ammunition maintenance/ storage facility would be constructed for the JDAMs in the northeast portion of the MSA in association with other munitions storage areas. Its location would be consistent with safety requirements that specify sufficient separation among munitions facilities and from other land uses.

As the aircraft beddown progresses, it is anticipated that there could be numerous construction activities, unidentified in the current proposal, but could arise indirectly because of the proposed action. While these are unknown at this time, most, if not all, would be minor construction projects and/or projects much smaller in scope (e.g., remodeling, adding small additions, re-paving roads) than those listed in Table 2-12. Since it is impossible to identify all of these projects at this time, the Air Force will ensure that the appropriate NEPA documentation will be performed prior to implementation. Those projects that are consistent with this action and of little environmental impact will be tiered to this document. Those actions which may have a larger impact or are greatly out of the scope of this document will be analyzed separately.

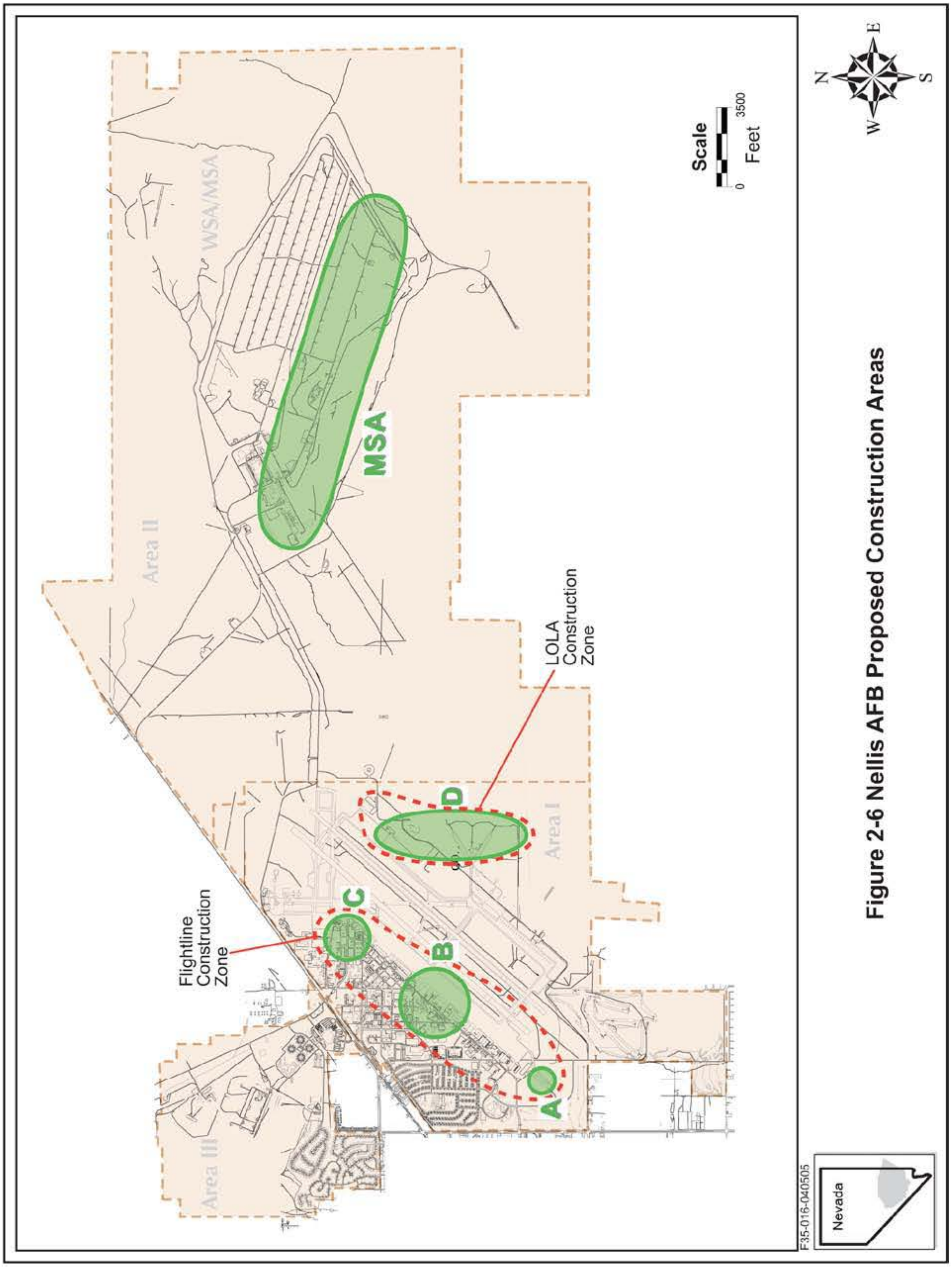


Figure 2-6 Nellis AFB Proposed Construction Areas

Proposed Personnel Changes

Personnel positions at Nellis AFB would be increased by a total of 412 by completion of the beddown in 2020. Personnel changes begin in 2012 with a total of 222 personnel being added at the base to support the FDE program in years 2012 and 2016. In 2014, before the start of the WS program, another 175 personnel would be added. In 2020, an additional 15 personnel would arrive at which point personnel positions at Nellis AFB would peak. The F-35 FDE and WS personnel would constitute a 3.4 percent increase in overall 2006 base personnel levels of 12,284. These personnel positions have been developed for Air Force military and civilian employees in direct support of the F-35 FDE and WS programs. Ancillary increases to the local population are likely but are impossible to accurately predict; but they could be as many as several hundred. The majority of these personnel would be contractor employees of aircraft manufacturers. Fluctuations in programs, funding, and staffing would continue at Nellis AFB, likely making such a minor change unnoticeable.

2.3.2 Nevada Test and Training Range

Proposed Use of Nevada Test and Training Range

The proposed action of the F-35 beddown would not alter the structure, management, or safety procedures, nor introduce more personnel at NTTR. Existing instrumentation, currently planned upgrades, and existing threat emitters would suffice for the F-35 FDE program and WS.

By 2012, the F-35 would begin to conduct ordnance delivery of any munitions capable of being deployed by the legacy fighters. The JDAM represents the principle munitions expected to be carried by the F-35 with the exception of depleted uranium anti-tank rounds. JDAMs consist of 500; 1,000; and 2,000-pound bombs guided to the target by an attached Global Positioning System (GPS) receiver. Once the weapon has been programmed with the target position in GPS coordinates, it can be delivered in any weather and visibility conditions. These weapons do not require any laser guidance. Roughly 50 percent of the JDAMs used by the F-35s would consist of inert ordnance; the other 50 percent would be live ordnance. All munitions releases would occur on approved targets and ranges within NTTR. Table 2-13 presents the average annual use of ordnance and flares at NTTR. Based on the total tonnage of ordnance used on NTTR from 1991 through 1995, use of ordnance by the F-35s would represent a 6 to 10 percent contribution to the total, depending on year-to-year variations. Due to its stealth characteristics, the Air Force expects the F-35 to employ flares less frequently than legacy aircraft. Total F-35 flare use would comprise 2 percent of NTTR total. The F-35 would use ordnance within the parameters and restrictions applicable to NTTR. No new safety procedures or restrictions would be needed to accommodate F-35 testing and WS activities at NTTR.

Table 2-13 Average and Proposed Annual Use of Ordnance and Flares at NTTR		
	Ordnance	***Flares***
Other Aircraft	3,000 to 4,500 tons (50% inert)	250,000
F-35	180 to 300 tons (50% inert)	16,000

Proposed F-35 Use of the Nevada Test and Training Range Airspace

As a replacement for the legacy fighter aircraft, the F-35 would adopt similar missions and training programs. Therefore, the Air Force expects that the F-35 FDE program and WS would use NTTR in a similar manner to the legacy fighter programs. No changes would need to occur to NTTR airspace structure or management as a result of the proposed action. All F-35 sortie-operations would take place in existing approved NTTR airspace.

The nature and duration of F-35 flight activities would be the same under both the FDE program and WS. Although each program focuses on different goals and requires different instrumentation, they provide feedback to each other in order to produce the best available tactics and capabilities (refer to Table 2-2, which details the primary test and training activities projected for F-35s under the FDE program and WS).

Missions flown by aircraft assigned to either the FDE program or the WS would operate within the general flight parameters discussed previously. F-35 missions would concentrate on testing and evaluating flight maneuvers and tactics to fully develop the combat capability of the aircraft. The WS F-35 flight activities would follow a syllabus of approximately 35 missions over a 6-month period designed to simulate different combat scenarios and teach advanced tactics developed and/or evaluated by the FDE program. Some of the F-35 missions would include aerial refueling with tankers, using existing tanker aircraft already operating in high-altitude refueling tracks over NTTR.

Using the full array of authorized capabilities of NTTR, the F-35 can operate from a low altitude of less than 500 feet AGL up to 50,000 feet MSL or higher. However, the F-35 would most often operate at medium altitudes of 5,000 to 25,000 feet MSL or higher. Table 2-14 presents the projected altitude profile for F-35 operations in NTTR airspace.

Table 2-14 Projected F-35 Altitude Profile		
Altitude	***Feet***	***Percent Time***
Very Low	< 500 feet AGL	10
Low	500 feet AGL to 5,000 feet MSL	20
Medium	5,000 to 25,000 feet MSL	45
High	> 25,000 feet MSL	25

The need for the F-35 to fly at lower altitudes stems from its missions associated with close air support and similar operations. Nonetheless, 70 percent of F-35 sortie-operations would occur above 5,000 feet

MSL. Given that the F-35 will supplement and potentially replace legacy fighter aircraft, its altitude profile represents a blending of different mission types.

To test and train with the full capabilities of the aircraft, the F-35 would employ supersonic flight. All supersonic flight would occur at altitudes and within airspace already authorized for such activities. Flight activities leading to supersonic events would commonly involve use of subdivisions of the Desert MOA and portions of restricted areas depicted in Figure 2-4. The Air Force anticipates that approximately 3.5 percent of the time conducting air combat maneuvers would involve supersonic flight. In comparison, F-16 aircraft conduct supersonic flight for 10 percent of the time when conducting air combat maneuvers. Inclusion of F-35 sortie-operations would raise overall supersonic activity in NTTR by less than 1 percent. It is anticipated that most of these operations would occur above 25,000 feet MSL.

Past patterns of use for NTTR demonstrated that annual sortie-operations ranged from 200,000 to 300,000 with the existing and authorized aircraft at Nellis AFB and common usage by others (Air Force 1999b). Operations by F-35 would add to these totals, reaching to between 251,840 and 351,840 from 2020 onward; total sortie-operations would increase by 26 percent under the low scenario and 17 percent under the high scenario.

The 8,460 *sorties* by the F-35 would represent approximately 51,840 *sortie-operations* in the major airspace units encompassed by NTTR (Table 2-15). The number and distribution of F-35 sortie-operations derive directly from the existing use patterns of FDE program and WS for legacy aircraft. F-35 sortie-operations would represent a 26 percent contribution to the total NTTR sortie-operations under the low-use (51,840 annual sortie-operations) scenario and 17 percent contribution under the high-use (51,840 annual sortie-operations) scenario.

Table 2-15 Projected F-35 Sortie-Operations by Airspace Unit

Airspace Unit	***Low-Use***			***High-Use***		
	F-35	*All Aircraft*	*Percent Increase Over Baseline*	*F-35*	*All Aircraft*	*Percent Increase Over Baseline*
Desert MOA	15,480	66,704	30	15,480	91,650	20
Reveille MOA	4,207	18,308	30	4,207	25,181	20
R-4806	4,322	34,456	14	4,322	48,457	10
R-4807	19,683	93,810	27	19,683	131,804	18
R-4808[1]	3,368	16,321	26	3,368	23,376	17
R-4809	4,717	22,242	27	4,717	31,372	18
Total	**51,777**	**251,841**	**26**	**51,777**	**351,840**	**17**

[1] DOE Airspace overlying NTS; sortie-operations transit only.

Although the F-35's stealth features reduce its chance of being detected, it will employ flares as defensive countermeasures. Currently, approximately 250,000 flares are dispensed annually over NTTR. Flare use operates under minimal altitude restrictions to ensure safety, as noted previously. These minimum

altitudes provide sufficient time for complete combustion and consumption of the flares before potential contact with the ground. The altitude restrictions provide a buffer against inadvertent low releases that might result in burning material contacting the ground.

Flare use for the F-35s would adhere to all Nellis AFB and ACC directives including release altitude standards and are anticipated to use the same types of flares as other fighter aircraft (e.g., F-16). These minimum standards ensure complete burn-out of flares at least 100 feet above the ground or higher. In NTTR's MOAs, the minimum flare release altitude would remain unchanged at 5,000 feet AGL for all aircraft including F-35s. Based on the flight altitude profile for the F-35, the Air Force anticipates that roughly 70 percent of F-35 flare release throughout NTTR (including restricted areas) would occur above 5,000 feet MSL. The F-35 would employ approximately 16,000 flares per year over NTTR and contribute 6 percent to total flare use by all aircraft, depending upon annual variations in activities.

2.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS AND OTHER REGULATORY REQUIREMENTS

This section outlines the elements of the process and other regulatory requirements. It also addresses public involvement.

2.4.1 Environmental Impact Analysis Process

This EIS was prepared in conformance with NEPA and associated regulations. NEPA (Public Law 91-190, 42 U.S.C. 4321-4347, as amended) was enacted to establish a national policy for the protection of the environment. It also established the CEQ to implement the provisions of NEPA and review and appraise federal programs and activities in light of NEPA policy. CEQ developed regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508). These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing EISs to comply with NEPA; 32 CFR Part 989, which implements the CEQ regulations with regard to Air Force actions, defines the steps and milestones in the Environmental Impact Analysis Process (EIAP). Major milestones in the EIAP for the proposed F-35 beddown at Nellis AFB include the following:

- publishing of a Notice of Intent (NOI) to prepare an EIS;
- conducting public scoping meetings and inviting public and agency input to determine and define the significant issues to be addressed in the EIS;
- collecting data on the affected environment to provide a baseline for analyzing the effects of the proposed action;
- assessing the potential impacts of the proposed action and no-action alternative on the environment;
- preparing and distributing a Draft EIS for public review and comment;

- establishing a public review period, including public hearings to solicit comments on the analysis presented in the Draft EIS;
- preparing and distributing a Final EIS incorporating all comments received on the Draft EIS and responding to the substantive issues raised during the public review period; and
- publishing a Record of Decision (ROD) no sooner than 30 days after the availability of the Final EIS, outlining the Air Force's decision.

2.4.2 Other Regulatory Requirements

Permits: Should the proposed action be implemented, the Air Force would need to update existing permits or obtain new ones. These permits would apply to the removal and disposal of asbestos as a result of demolition of, and modifications to, on-base buildings; construction of new buildings (as needed); and updating existing operating permits under the Clean Air Act.

Asbestos Removal and Disposal: Prior to demolition or additions to buildings, asbestos surveys are required by Air Force regulation. For the removal of asbestos, a notification process with Clark County, the state health board, the United States Environmental Protection Agency (EPA), and the base hazardous waste coordinator is required. Removal would be contracted to state-certified and licensed contractors and removed and managed in accordance with the Asbestos Management and Operations Plan (Air Force 2003a). Contractors will obtain the necessary permits for the removal, handling, and transportation of asbestos. Contractors must have access to a permitted landfill for asbestos disposal.

Construction: The base must submit building plans and a request for location to the base zoning and development board for new buildings. An air quality dust permit must be obtained from Clark County if the building site causes 0.25 acre or more of topsoil disturbance. The Clark County Surface Disturbance Permit would be applied for by Nellis AFB after finalization of the building footprints and prior to construction.

Energy Conservation: Executive Order 13423 *Strengthening Federal Environment, Energy, and Transportation* requires all federal agencies to implement petroleum and water conservation measures, pollution prevention and recycling practices, and reduction or elimination of toxic or hazardous chemicals. New construction and major renovation of buildings must comply with the 2006 *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding.*

Title V Permit: Modifications to the current base-wide Title V Permit will be required if equipment other than mobile aircraft maintenance equipment were added or replaced. Due to a base exemption, no modifications are required for changes or additions to mobile equipment used to maintain or service planes on the ground (e.g., aerospace ground equipment). However, Clark County air quality operating

permits for individual pieces of equipment will have to be modified for all changes. All modifications to the Title V Permit and the Clark County air quality operating permits and authority to construct will be applied for by Nellis AFB after finalization of equipment needs. In April 2007, a consolidated New Source Review permit was issued to Nellis AFB (DAQEM 2008).

Nellis AFB Plans and Protocols: In addition to the federal, state, and local regulations, Nellis AFB institutes its own implementing regulations and guidance. Table 2-16 lists the plans and reports Nellis AFB produces to ensure compliance with federal, state, and local regulations.

Table 2-16 Nellis AFB Environmental Plans

Resource Area	***Title***	***Date***
Cultural Resources	Integrated Cultural Resources Management Plan	2010
Air Quality	Nellis AFB Air Emissions Inventory	2009
	NTTR Air Emissions Inventory	2009
Environmental Restoration Program	Environmental Restoration Plan Management Action Plan	2004
Noise, Land Use and Planning	Air Installation Compatible Use Zone Study	2004
	General Plan for Nellis Air Force Base Includes General Plan Summary for Indian Springs Air Force Auxiliary Field	2002
Asbestos	Asbestos Management and Operations Plan	2003
Lead-Based Paint	Lead-based Paint Management Plan	2003
Environmental Emergencies	Facility Response Plan	2006
Hazardous Waste	Hazardous Waste Management Plan	2002
Hazardous Materials	Hazardous Materials Management Plan	2006
Natural Resources	Integrated Natural Resources Management Plan	2007
Stormwater	Storm Water Pollution Prevention Plan	1998

Agency Consultation: Both NEPA and CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP), concerned federal, state, and local agencies (such as the USFWS, Bureau of Land Management [BLM], Nevada Division of Environmental Protection, and the Nevada State Historic Preservation Officer [SHPO]) must be notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action. This was accomplished in two ways: 1) agencies were contacted early in the EIS process through interagency correspondence to solicit their comments on the proposed action and no-action alternative, and 2) the Air Force also conducted scoping meetings. Appendix A provides a summary of public participation and consultation including a copy of the IICEP letter sent to agencies, a list of recipients, and any responses received. Comments from these agencies were reviewed for incorporation into the environmental analysis for this EIS.

Government-to-Government Consultation: Several laws and regulations address the requirement of federal agencies to notify or consult with American Indian tribes or otherwise consider their interests

when planning and implementing federal undertakings. In particular, on April 29, 1994, the President issued the *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments.

As part of the NEPA process, 37 members of the Nellis AFB Native American Program (NAP) who represent 19 tribes with historical ties to the land in the vicinity of NTTR were notified at the initiation of the project as part of an ongoing government-to-government consultation between Nellis AFB and these tribes. Keith Myhrer, Archaeologist and Nellis AFB NAP Manager coordinated consultation between the Air Force and the tribes. The list of consulted tribes is presented in Appendix A. These 19 tribes have aligned themselves together to form the Consolidated Group of Tribes and Organizations (CGTO). This group is formed by officially appointed representatives who are responsible for representing their respective tribal concerns and perspectives. In 1999, the CGTO elected five members to a Document Review Committee (DRC) who review numerous types of environmental documents and cultural resources reports, coordinate with tribal members, and provide comments to represent the members of the Nellis AFB NAP. The DRC was involved in the review of the Draft EIS and provided their comments to the Air Force.

2.4.3 Public Involvement Process

CEQ regulations governing the NOI and scoping and 32 CFR Part 989 require an early and open process for identifying significant issues related to a proposed action and obtaining input from the public prior to making a decision that could potentially affect the environment. These regulations specify public involvement at various junctures in the development of an EIS, including public scoping prior to the preparation of a Draft EIS, and public review of the Draft EIS prior to finalizing the document and making a decision. Appendix A of this EIS includes a summary of public participation and the materials disseminated during this process.

This EIS adhered to these requirements by using public scoping and federal, state, and local agency input to assist in focusing the discussion on potentially significant issues. Identifying those issues and topics warranting detailed discussion in this EIS involved three primary steps: 1) soliciting issues from the public through the scoping process and from agencies and American Indian Tribes through the IICEP process; 2) reviewing all identified issues and determining if they would actually be affected by the proposed action; and 3) determining those resources (e.g., air quality, land use) and subsets of resources (e.g., environmental justice as a part of socioeconomics) that represent significant issues. Those issues determined to not warrant further detailed study are described in the following sections along with the justification for their exclusion.

Prior to the publication of the Draft EIS, the public involvement process included publishing the NOI in the *Federal Register* on August 23, 2004. After public notification in newspapers and radio stations, five scoping meetings, averaging 2 hours in duration, were held September 13 through September 17, 2004 at the following Nevada locations: Carson City, Alamo, Pioche, Pahrump, and Las Vegas. A total of 40 people attended the meetings and provided written comments. By the end of the scoping period, October 1, 2004, nine written comments and one agency letter were received.

Following these scoping meetings, the Air Force prepared the Draft EIS and made it available to the public and agencies for review and comment. The document was sent to those in the public who requested a copy and was made available at selected public facilities such as libraries and local government agencies within Nevada. The 45-day public review period began April 4, 2008 when the Notice of Availability of the Draft EIS was published in the *Federal Register*. Public hearings were held to provide an opportunity for the public to comment on the analysis contained within the Draft EIS. The hearings were conducted April 22 through April 24, 2008 in these Nevada locations: Las Vegas, Caliente, and Alamo. These locations were selected for the following reasons: interest in the proposal remained high in Las Vegas and Alamo, and both form part of the affected area; Alamo and Caliente, as indicated by findings in the analysis, were representative communities central under the MOA airspace – both communities revealed interest in the proposal; Pahrump lies outside the affected airspace and showed low levels of interest, whereas Pioche reflected negligible public interest. Seven people attended the three hearings. While none of the attendees provided oral or written comments, three persons expressed opposition to existing and proposed aircraft overflights suggesting a decrease in home values and quality of life. The Air Force received an additional 10 written comments during the public comment process. The closing date of the comment period was May 22, 2008. Appendix G in the Final EIS provides the public, agency, and Native American comments with Air Force responses.

These written comments raised issues with existing noise over the small communities under NTTR airspace, noise impacts and land use planning, impacts from noise to minority and low-income populations around the base, and requirements to coordinate with Clark Counties Department of Air Quality and Environmental Management regarding conformity with state and county plans. Also, the CGTO presented numerous comments concerning American Indian resources.

Comments received during this public review and comment period were addressed and are included in this Final EIS to be provided to the decision maker for consideration. A copy of the Final EIS will be published and made available to the public. The Final EIS includes responses to comments and questions received during the public comment period. After a minimum of 30 days of review, the Air Force may publish a ROD. The ROD will specify the selected alternative, how it will be implemented, and mitigation measures, if any, that will be employed to minimize adverse environmental impacts.

Issues Derived from Public Scoping and IICEP. Of the nine written comments received from individuals during the scoping meetings, three citizens from Alamo expressed concern about sonic booms—the number, severity, potential for structure (i.e., window) damage, and human disturbance. One of the commentors asked if a restricted area could be created over the town. Two other areas of concern were how the F-35 would operate and the way in which it would fly within current airspace. In Las Vegas, one commentor asked if the F-35s would be used in the same way at the range (e.g., flights per day, how low, how fast) while another commentor expressed concerns about noise, radar interference, safety for the residential areas to the east, and EPA results. One person in Pioche commented that during the fall hunting season, deer appeared to be scared by early morning flights in airspace over the central portion of NTTR. In Carson City, two attendees verbally (i.e., no written comments were received) expressed concern for potential low-altitude flight conflicts over areas being considered and/or used for wind generation under the NTTR airspace.

A letter from the Nevada State Clearinghouse with comments from the SHPO and Nevada Department of Wildlife was received during the scoping period. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties and to specify the process to be taken to address federal laws. The Nevada Department of Wildlife expressed concern for three state-listed species: 1) the Phainopepla (*Phainopepla nitens*), a state-imperiled neotropical migrating bird; 2) the burrowing owl (state vulnerable species); and 3) the kit fox, a species of conservation priority in Nevada. No other agency comments were received during the scoping period.

Assessment of Identified Issues. Identified issues correlate to one or more resource categories used in environmental analysis. For example, an issue raised concerning the effects of sonic booms would apply to several resource categories including noise, land use, biological resources (wildlife), cultural resources, and recreation. Scoping, IICEP, and Air Force internal evaluation yielded potential issues correlating to nine resource categories (Table 2-17). Each resource category (and its subsets) was analyzed to determine if and how the proposed action would affect it. This was accomplished by:

- identifying the types and location of all elements of the proposed action;
- determining the relationship or interaction of these elements with the resources and their subsets; and
- assessing if and how these resources and subsets would be affected.

Table 2-17 F-35 Scoping of Issues for Environmental Impact Analysis Process

Resource	***Public/Agency/ Air Force Scoping***	***Affected Area***	
		Nellis AFB	*NTTR*
Airspace and Aircraft Operations	X	X	X
Noise: Subsonic	X	X	X
Supersonic	X	NA	X
Air Quality	X	X	X
Safety	X	X	X
Land Use and Recreation	X	X	X
Socioeconomics and Infrastructure	X	X	NA
Environmental Justice and Protection of Children	X	X	NA
Soils and Water Resources	X	X	NA
Biological Resources	X	X	X
Cultural Resources	X	X	X
Hazardous Materials/Waste	X	X	NA

Notes: NA = Analysis not discussed in detail in EIS.

2.5 DIFFERENCES BETWEEN THE DRAFT EIS AND FINAL EIS

While this Final EIS is, in large part, the same as the Draft EIS, it reflects consideration of comments received during the public comment period and includes factual corrections, improvements, and/or modifications to the analyses presented in the Draft EIS. Modifications include updated proposed construction projects and start dates (refer to Table 2-12), as well as a revised timeframe for the F-35 beddown (see Table 2-10). Also modified in the Final EIS is a re-evaluation of projected noise impacts (Section 4.3). Since the 2008 publication of the Draft EIS, the flight profiles and noise signature of the F-35 at the various stages of fight have been defined (refer to Section 3.3 for specifics on this topic). Also, new noise impact metrics now include speech interference and sleep disturbance; Sections 3.3, 4.3, and Appendix C were revised accordingly. Due to the new profiles and noise signatures, revised projected noise contour bands were also produced and potential impacts presented in Sections 4.3 (Noise), 4.6 (Land Use and Recreation), and 4.8 (Environmental Justice). Air quality evaluations (Sections 3.5 and 4.5) were also updated to reflect changes in proposed construction projects and start dates (Appendix D), the F-35 revised beddown phasing, and the outcome of the conformity determination (Appendix E). None of the modifications made to this Final EIS resulted in substantive changes to the proposed action. The conclusions presented in terms of environmental consequences and impacts remain consistent with those presented in the Draft EIS.

2.6 SUMMARY OF IMPACTS

Table 2-18 presents a summary of the impacts associated with the proposed beddown of 36 F-35 aircraft for the FDE program and WS at Nellis AFB. The table compares the effects of the proposed action to those of the no-action alternative.

Table 2-18 Comparison of Alternatives by Resource and Potential Impact

Proposed Action	***No-Action Alternative***
AIRSPACE AND AIRCRAFT OPERATIONS	
Nellis AFB	
• Increase total Nellis AFB airfield operations by 20 percent • No change to airfield airspace structure or operational procedures; no impact to civil and commercial aviation airspace • No change in departure and arrival routes	• Average annual airfield operations remain at 85,000 • Existing departure and arrival routes would continue to be used
NTTR	
• No change to current special use airspace structure • F-35 would increase current total sortie-operations by 51,840 annually, for a total ranging from 251,840 to 351,840. This would represent a 26 percent increase under the 251,840 use scenario and a 17 percent increase under the 351,840 scenario. This increase would not exceed NTTR capability • A less than 1 percent increase in supersonic activities • No changes or increased need for supersonic-designated airspace • No impact to civil and commercial aviation	• MOAs and restricted areas continued to be used • Continued conducting 200,000 to 300,000 annual sortie-operations in NTTR • Maintain and use existing supersonic-designated airspace • Continued coordination with area Air Traffic Control to ensure safe airspace for all users

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
NOISE	
Nellis AFB	

• Beddown would generate a 42 percent increase (an additional 7,562 acres) in areas exposed to 65 dB DNL and greater by the year 2020
• 20 Representative locations would experience:
  • increases of between 1 and 3.4 dB DNL in noise levels
  • populations in on-base dormitories would continue to be exposed to PHL in the 80 to 85 dB DNL contour bands
  • an increase in daytime speech interference events when windows are closed 1 to 3 more times an hour; when windows are open, events would increase between 2 and 3 more times per hour
  • an increase in probability of sleep disturbance between 1 and 7 percent with windows closed and 1 and 10 percent with windows open
• Nellis AFB would continue noise abatement procedures to reduce overflights of residential areas and nighttime operations and run-ups
• Noise complaints and annoyance levels in the Nellis AFB vicinity may increase
• No adverse impacts to hearing and health would be anticipated
	• Approximately 18,000 acres continue to be exposed to 65 dB DNL and greater noise levels
	• For PHL, populations within dormitories would continue to be exposed to 80 to 85 dB DNL contour bands
	• Noise abatement and safety procedures would continue to be implemented

NTTR	
• Subsonic noise would increase an average of 3 dB in 12 of the 21 airspace units under the 251,840 sortie-operations scenario and in 4 of the 21 airspace units under the 351,840 sortie-operations scenario • Supersonic noise would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807 and R-4809 under the 251,840 scenario • Under the 351,840 scenario, supersonic noise would increase by 1 dB • Sonic booms would increase by 2 per month in R-4807 and by 1 per month in Desert and Reveille MOAs under the 251,840 scenario • Under the 351,840 scenario, booms would increase by 2 per month in almost all airspace units with the exception of the Elgin MOA where booms could increase by 4 per month • Noise complaints and annoyance levels may increase due to increased boom numbers • No adverse impacts to hearing and health	• Baseline subsonic noise levels would continue to range from less than 45 to 65 dB DNL for the 200,000 and 300,000 scenarios • Supersonic noise levels would continue to range from less than 45 to 57 dB CDNL under the 200,000 and 300,000 scenarios • Sonic booms range from 2 to 24 per month at 200,000 sortie-operations per year and 3 to 35 per month at 300,000 sortie-operations per year

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
AIR QUALITY	
Nellis AFB	
• *De minimis* levels would be exceeded for CO and NO_x; however, the Air Force has coordinated with Clark County's Department of Air Quality and Environmental Management to include 185 tons of NO_x into their ozone State Implementation Plan (SIP) revision • While there are CO exceedances, they are covered in the Clark County CO SIP so these increases would not be adverse nor preclude the county from NAAQS attainment • No visibility impairments to PSD Class I areas	• Nellis AFB would continue to contribute less than 1 percent of all criteria pollutant emissions in Clark County
NTTR	
• Projected emissions would increase negligibly in Lincoln and Nye counties; this would not change the regional significance from baseline conditions	• Nye and Lincoln Counties (only 5 percent of NTTR airspace falls within Clark County) would continue in attainment for all criteria pollutants • Within Lincoln and Nye counties, NTTR operations would continue to represent a limited regional contributor for NO_x and SO_x
SAFETY	
Nellis AFB	
• No changes in safety due to operations and maintenance, fire and crash response, and munitions use and handling procedures • Additional munitions facilities and expansion of the live ordnance loading area would be constructed to support the increase in airfield operations; this would enhance safety • No anticipated increase to bird/wildlife-aircraft strike hazards or aircraft mishaps above baseline levels therefore, no impacts	• Operations and maintenance, fire and crash response, and munitions use and handling activities conducted on Nellis AFB would continue to be performed in accordance with applicable Air Force safety regulations • The low potential for mishaps would continue • Bird/wildlife-aircraft strikes in the airfield environment would remain minimal; over a 14-year period there have been 233 bird strikes (occurring with over 1 million airfield operations), averaging about 17 per year

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
SAFETY	
NTTR	
• All current fire risk management procedures would remain unaffected due to the F-35 beddown • Estimated time between Class A mishaps would remain low (2 to 45 years) with the increase in NTTR airspace use • Increase in use of flares could cause a negligible (<0.1 percent) increase risk of wildfires; however, existing fire response procedures would adequately address this minimal increase • No significant increase in bird/wildlife-aircraft strike hazards	• A total of approximately 4 to 5 fires, of less than 3 acres, occur annually on the ranges; this would continue • Estimated time between Class A mishaps within NTTR airspace ranges between 3 and 68 years under the 200,000 sortie-operations scenario and 2 and 45 years under the 300,000 sortie-operations scenario • Safety procedures for ordnance and flare use would continue to be enforced to minimize risks • Probability of bird/wildlife-aircraft strikes would continue to be negligible; ten strikes have been reported over the past 10 years
LAND USE AND RECREATION	
Nellis AFB	
• Noise impacts to residential, public, open, and industrial land uses would decrease in acres by 25 percent from baseline conditions when compared to the land use contours established by Clark County • No impact to recreation	• Surrounding areas (industrial, commercial, open, recreational, public, and residential land uses) would continue experiencing noise levels of 65 dB DNL and greater
NTTR	
• No change to land status or land management • 3 dB or less change in subsonic noise and 1 dB or less change in supersonic noise levels over special use land management areas • Recreational areas underlying the Elgin MOA could experience an increase of 4 booms per month with the maximum sortie-operations (351,840) scenario; other areas might expect an increase of up to 2 booms per month • Aircraft emissions and overflights would not impair visual quality	• NTTR lands would continue being primarily managed by DoD, BLM, USFWS, and U.S. Forest Service • Special use land management areas would continue to be exposed to aircraft operations
SOCIOECONOMICS AND INFRASTRUCTURE	
Nellis AFB	
• Net increase of 412 active duty personnel at Nellis AFB by 2020 (3.4 percent increase over 2006) • Nearly $28.3 million in additional payroll disbursements with increased personnel • Adequate housing and utility supply; no adverse impact on area public schools • Increase in traffic during construction would be temporary and localized; should not adversely impact existing delays experienced by on-base traffic • No appreciable changes to utilities ability to meet minor increases in demand	• Nellis AFB active duty or civilian workforce would remain similar to those found currently • Total annual payroll expenditures would remain consistent • Housing and utility supply would continue without restraint and public school enrollment would remain similar to levels found under baseline conditions • Delays at particular Nellis AFB intersections would continue as they currently exist

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN	
Nellis AFB	
• About 57,736 people would be affected by noise levels within 65 dB DNL and greater contour bands, an increase of 17,000 over baseline levels • Of this total, 30,257 represent minority populations, an increase of 12,015 from baseline conditions • Low-income populations would increase from 5,406 to 6,673 (or by 1,267 individuals) • Schools would be exposed to noise levels of 65 dB DNL and greater; however, safety risks to children would not increase	• Impacts to human health and environmental conditions in minority and low-income communities would remain similar to conditions found currently • Schools currently affected by noise levels 65 dB DNL and greater would continue to be exposed to these noise levels
SOILS AND WATER RESOURCES	
Nellis AFB	
• Approximately 36 acres would be disturbed over a 5-year construction period; most of the proposed construction would occur over previously developed land or replace existing buildings • Best management practices (e.g., erosion and dust controls) for construction would minimize the potential for erosion • No adverse effects to availability of surface water or groundwater; no additional water right required	• Nellis AFB would continue to implement standard construction and erosion control procedures to limit erosion for planned/approved construction projects • Existing water availability and use rates would continue to be adequate for base missions and personnel
BIOLOGICAL RESOURCES	
Nellis AFB	
• One federally-listed special status species (desert tortoise) found on Nellis AFB; the base would avoid this species and consult with USFWS as applicable • Only one plant (a state-species of concern) is known to occur on Nellis AFB; the base would work with the Nevada Department of Fish and Wildlife to avoid impacts to this sensitive species	• Existing plans would continue to address management and protection of the desert tortoise • The status of one plant state species of concern would not change; plans to manage and protect this species would not change
NTTR	
• Flare use would increase, but the risk of wildfire would remain minimal • Use of existing targets; therefore, no new ground disturbance on NTTR • No changes in existing impacts to the desert tortoise would be anticipated; implementation of the rules and procedures in management of this species would continue to minimize any potential impacts • Increases to subsonic (3 dB) and supersonic (1 dB) noise would not adversely impact wildlife	• The only known federally-listed species occurring on the ranges is the desert tortoise within the South Range; implementation of existing rules and procedures in relation to this species would continue

Table 2-18 Comparison of Alternatives by Resource and Potential Impact (con't)	
Proposed Action	***No-Action Alternative***
CULTURAL RESOURCES	
Nellis AFB	
• Construction would avoid a National Register-eligible site in Area II • Cold War structure inventory is in progress but any potentially eligible sites would be avoided • No effect on traditional cultural resources	• No change resulting from the F-35 beddown to existing cultural resource conditions • No traditional cultural resources on base or in area immediately adjacent to the base
NTTR	
• Noise and sonic booms unlikely to affect archaeological sites or architectural resources • Increase of 1 to 4 sonic booms per month in the airspace units could be considered to affect setting of sacred and traditional use areas, but not adversely	• Conditions at 5,000 archaeological sites estimated beneath NTTR airspace would remain similar to what is found currently • Over 50 historic mining sites, rock art, traditional use areas, and sacred sites in NTTR would continue to be managed and protected through implementation of existing Nellis AFB plans
HAZARDOUS MATERIALS AND WASTE	
Nellis AFB	
• No change in large quantity generator status • No change to existing management protocols required • Four potential F-35 construction sites may occur above ERP sites, an ERP waiver would be required prior to construction • No new types of hazardous materials would be introduced • F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year, approximately a 6 percent increase	• Nellis AFB would continue to be a large quantity generator • Procedures for renovation or demolition activities would continue to be reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos

3.0 AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 ANALYSIS APPROACH

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. It also provides that an EIS should consider, but not analyze in detail, those areas or resources not potentially affected by the proposal. Therefore, an EIS should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EIS should provide sufficient detail and depth to ensure that the agency (i.e., Air Force) took a hard look. NEPA also requires a comparative analysis that allows decision makers and the public to differentiate among the alternatives. This EIS focuses on those resources that would be affected by the proposed beddown of F-35s at Nellis AFB, Nevada.

CEQ regulations (40 CFR Parts 1500-1508) for NEPA also require an EIS to discuss impacts in proportion to their significance and present only enough discussion of other than significant issues to show why more study is not warranted. The analysis in this EIS considers the current conditions of the affected environment and compares those to conditions that might occur should the Air Force implement either the proposed action or no-action alternative.

3.1.1 Affected Areas

The proposed action includes components affecting Nellis AFB, NTTR, or both. Some components, such as F-35 construction projects, essentially affect only the base due to their limited geographic scope. Although minimal, the proposed changes in personnel would not only affect the base, but its economic and social effects would extend out into the general Las Vegas community. Affected areas for noise generated by airfield operations would include much of the base and lands adjacent to the base. NTTR and its associated airspace forms another affected area with a similar, but distinct set of components. For example, increases in aircraft operations generate more noise at NTTR, just like at Nellis AFB. Similarly, the effects of ordnance delivery are exclusive to NTTR. Table 3.1-1 highlights the affected areas analyzed for each resource.

Table 3.1-1 Resources Analyzed in the Environmental Impact Analysis Process		
Resource	***Nellis AFB***	***NTTR***
Airspace and Aircraft Operations	Yes	Yes
Noise (Subsonic and Supersonic)	Yes	Yes
Air Quality	Yes	Yes
Safety	Yes	Yes
Land Use and Recreation	Yes	Yes
Socioeconomics and Infrastructure	Yes	No
Environmental Justice and Protection of Children	Yes	No
Soils and Water Resources	Yes	No
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Hazardous Materials and Waste	Yes	No

3.1.2 Affected Environment and Resources Analyzed

Based on the components of the proposed action and scoping comments, the Air Force defined the environment potentially affected by the F-35 beddown. This definition focused on specific resource categories. As a result of this review, this EIS evaluated 11 resource categories: airspace and aircraft operations; noise; air quality; safety; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; soils and water; biological resources; cultural resources; and hazardous materials and waste (see Table 3.1-1). Due to the lack of potential impacts from the proposed action at NTTR (e.g., no construction would occur within NTTR, no increase in personnel at any of the NTTR facilities is anticipated, nor would low income or minority communities be affected by F-35 increased overflights) socioeconomics and infrastructure; environmental justice and protection of children; soils and water resources; and hazardous materials and waste were analyzed only for Nellis AFB. No changes to any of these resources from baseline conditions would occur at NTTR if the proposed action were adopted.

3.1.3 Definition of Baseline

Baseline conditions provide a benchmark against which an agency measures the effects of the proposed action. The differences in the conditions between baseline and proposed actions reflect the magnitude of impacts relative to the various resources analyzed. As such, the EIS must define the baseline conditions and timing.

For the proposed action, establishing baseline conditions is based on the timing of the components of the proposed action. However, the different components of the action—construction, aircraft beddown, operations, and personnel changes—would occur at different times. Since construction would start in 2011, the baseline employed for this component of the action consists of the current configuration and conditions at the base. The analyses for resources affected by construction, therefore, employed current

conditions as the baseline. For example, the air quality analysis compared the proposed action construction emissions (2011 through 2016) to current conditions based on best available information.

Under the proposed action, beddown and operation of the F-35 aircraft would be phased in over an 8-year period between 2012 and 2020. The analysis of airspace operations, safety, noise, and air quality all reflect the inventory and operations of aircraft at the start of this period based on actions authorized by the Air Force and fully analyzed under NEPA. This includes aircraft, such as the F-22A, which completed their beddown in 2009. The analysis addresses personnel changes associated with the proposed action in the same way.

3.2 AIRSPACE AND AIRCRAFT OPERATIONS

The safe, orderly, and compatible use of the nation's airspace is made possible through a system of flight rules and regulations, airspace management actions, and air traffic control procedures just as use of the nation's highway system is governed by traffic laws and rules for operating vehicles. The national airspace system is designed and managed to protect aircraft operations around most airports and along air traffic routes connecting these airports, as well as within special areas where activities such as military flight training are conducted. The FAA has the overall responsibility for managing the airspace system and accomplishes this through close coordination with state aviation and airport planners, military airspace managers, and other entities.

This section describes how the airspace, flight routes, and operating procedures have been designed to accommodate both military training and civil aircraft operations in the affected areas encompassing Nellis AFB and NTTR. Discussions of NTTR include the restricted areas and MOAs supporting Nellis AFB operations. Information was obtained from current aeronautical maps, flight information publications, Nellis AFB documents, and contacts with Air Force and FAA airspace and air traffic control management personnel.

3.2.1 Nellis AFB

Nellis AFB is one of the few military airfields located within the type of airspace (Class B) established around the nation's busiest airports. The outer lateral boundaries of this airspace are shown in Figure 3.2-1. Class B airspace requires all aircraft operating within the lateral and vertical limits of this area to be in communication with and under the positive control of an air traffic control facility to maximize the safe, orderly flow of all aircraft operating within this congested area. Designation of Class B airspace for the Las Vegas area was based on the high density aircraft operations conducted regularly at both Nellis AFB and McCarran International Airport and operations at the other airports in the area, for instance, North Las Vegas Air Terminal. In total, over a half million cumulative takeoffs and landings are conducted yearly at Nellis AFB and McCarran.

Departure and arrival flight routes established for each runway direction at Nellis AFB segregate base flight operations from civil air traffic at other local airports and standardize the flow of military flights between the base and NTTR. Two parallel runways (21 Left/03 Right and 21 Right/03 Left [21L/03R and 21R/03L]) are oriented in a northeast-southwest direction (Figure 3.2-2). In general, the flight routes follow both a north-south flow through the "Sally" Corridor portion of the Desert MOA for flights entering/exiting the eastern portion of NTTR (refer to Figure 3.2-1). East-west flow (paralleling Highway 95) is used for entering/exiting western portions of NTTR airspace. These routes contain specific directional and altitude requirements and advisory information that separate inbound/outbound aircraft

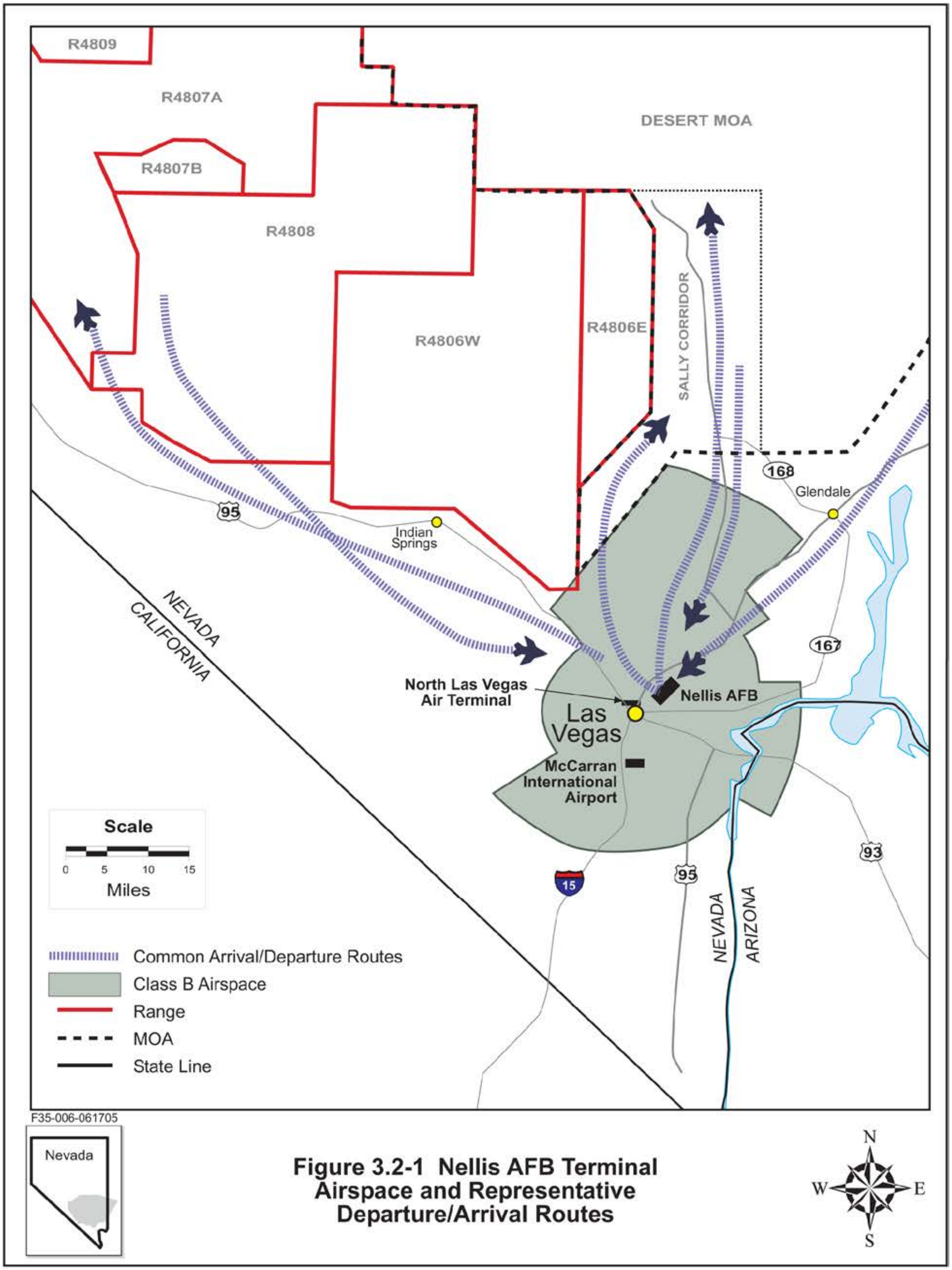
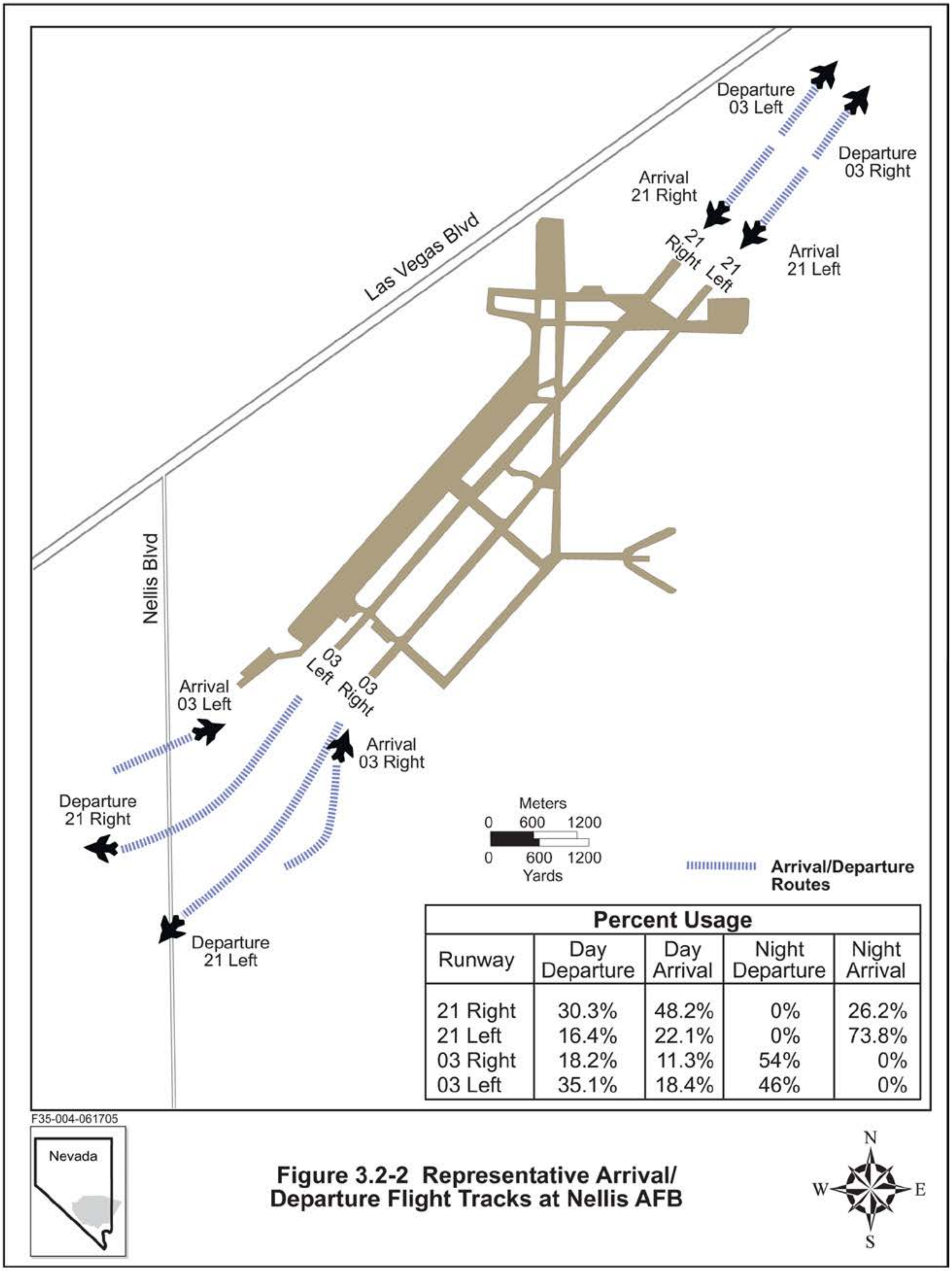


Figure 3.2-1 Nellis AFB Terminal Airspace and Representative Departure/Arrival Routes



Percent Usage				
Runway	Day Departure	Day Arrival	Night Departure	Night Arrival
21 Right	30.3%	48.2%	0%	26.2%
21 Left	16.4%	22.1%	0%	73.8%
03 Right	18.2%	11.3%	54%	0%
03 Left	35.1%	18.4%	46%	0%

Figure 3.2-2 Representative Arrival/ Departure Flight Tracks at Nellis AFB

while minimizing noise impacts on populated areas and maintaining safety buffers from the North Las Vegas Air Terminal and the NTTR training area. Aircraft departing from Nellis AFB expedite their turns and climbs after takeoff for noise abatement and to avoid populated areas around the base.

Factors such as local wind and weather conditions, noise abatement, mission requirements, and emergency conditions are considered for runway selection. Normal weekday daytime operations consist of aircraft departing to both the northeast and the southwest. When departing to the southwest, aircraft make immediate right turns to the north or northwest. Daytime arrivals are generally (70 percent) from the northeast.

All night operations depart to the northeast (03 Right/Left) to reduce aircraft noise effects on residences (see Figure 3.2-2). Inbound traffic follows the same flow to Nellis AFB and are funneled by air traffic control to a point 5 to 10 miles northeast of the base where they proceed straight inbound for landing on Runway 21 (arrival 21 Left/Right).

A summary of Nellis AFB airfield traffic counts since 1987 indicates that annual airfield operations have varied between 61,000 and 181,000 take-offs and landings (Air Force 1999b). There were roughly 85,000 airfield operations (takeoffs and landings) at Nellis AFB in FY02 (Air Force 2004c). The majority of these operations include NTTR arrivals and departures. Of that majority, about 70 percent enter and exit NTTR through the Sally Corridor (Air Force 2004c).

3.2.2 Nevada Test and Training Range

The NTTR consists of the Desert and Reveille MOAs and four restricted areas: R-4806, R-4807, R-4808, and R-4809. All NTTR airspace units support supersonic flight, with portions authorized for flights as low as 100 feet AGL in R-4807 and 5,000 feet AGL in MOAs (refer to Figure 2-3).

The development and use of renewable energy, such as Wind Generated Energy Facilities (WGEF) have become important, and several wind generators can be found in the region around NTTR. Range and airspace personnel at Nellis AFB are aware of the location of these generators and ensure aircrews are also aware of the objects and the potential impacts with regard to safety, electromagnetic interference (EMI) and radar signatures, and operational security.

Low-altitude avoidance and noise-sensitive areas are identified in NTTR flight instructions for various locations within and adjacent to NTTR, and FAA rules state that all aircraft must avoid persons, vehicles, and structures by 500 feet. Military pilots are instructed to avoid these locations by horizontal and vertical distances to enhance flight safety, noise abatement, and environmental sensitivity.

As noted in Chapter 2, NTTR baseline sortie-operations range from 200,000 to 300,000 annually. These sortie-operations are dispersed throughout the major airspace units and their subdivisions. Appendix B provides further information about sortie-operations within NTTR airspace.

Restricted Areas

A restricted area is airspace within which flight by non-participating aircraft, while not wholly prohibited, is subject to restriction during scheduled periods when hazardous activities are being performed (14 CFR Part 1.1). Restricted areas designated as "joint use" by the FAA, permit Air Traffic Control (ATC) to route nonparticipating aircraft through this airspace when it is not in use or when appropriate separation can be provided. Restricted areas R-4806 and R-4807 are delegated by the FAA to Nellis AFB for military control and operations, and are designated joint use. R-4808N is delegated to the DOE for those operations supporting NTTR activities and is not joint use, but some of this restricted area is jointly used by both the DOE and aircraft from Nellis AFB. R-4808S is used jointly by DOE below 10,000 feet MSL, Nellis AFB between 11,000 and 27,000 feet MSL, and the FAA at or above 28,000 feet MSL for overflights. With the exception of a portion of R-4806 (which begins at 100 feet AGL), all of these restricted areas extend from the surface up for an unlimited distance into the atmosphere.

R-4806 is used for conventional bombing and gunnery testing and training. Except for the extreme northern portion of this restricted area, all of R-4806 overlies the DNWR. R-4807 replicates an electronic battlefield with numerous simulated tactical targets such as tank convoys, munitions storage and sites, regimental/battery, air defense artillery units, etc. R-4807 is also used for overflights of a land area (Pahute Mesa) used by the DOE as an annex to the NTS. Portions of R-4809 are used jointly by the DOE and the Air Force. R-4809 is normally used by NTTR aircraft in conjunction with R-4807; however, the Tonopah Test Range airfield, located beneath R-4809, can be used as a divert base for in-flight emergencies and other non-routine operations. R-4809 also includes an electronic combat range.

Military Operations Areas

A MOA separates and segregates certain nonhazardous military activities from instrument flight rules (IFR) aircraft and identifies for visual flight rules (VFR) aircraft where these activities are conducted. The Desert and Reveille MOAs are used for air-to-air intercept training and abrupt maneuvers that may involve supersonic flight at and above 5,000 feet AGL. The base altitude of these MOAs is 100 feet AGL. Because a MOA has a base altitude of 100 feet AGL, unlike restricted areas which go down to the surface, these areas are only used for air-to-air operations. No bombs are released in the MOAs.

Since a MOA, by definition, only extends up to, but not including, 18,000 feet MSL, ATCAA is provided by the FAA on an as-needed basis to extend training airspace to higher altitudes in accordance with a Letter of Agreement with Nellis AFB.

The Desert MOA/ATCAA comprises the eastern half of NTTR and is normally scheduled and used during daylight hours Monday through Saturday. Any change to this normal schedule is disseminated by a Notice to Airmen (NOTAM) that advises all military and civil pilots of the use status. The Desert MOA/ATCAA is divided into subsections (Caliente, Elgin, and Coyote), which are used individually or in combination for air-to-air training. The Sally Corridor portion of the MOA is the primary transition route between Nellis AFB and most portions of NTTR.

The Reveille MOA/ATCAA is located in the northern portion of NTTR. This airspace is normally controlled by the FAA Salt Lake Air Route Traffic Control Center (ARTCC) when not activated for NTTR use. When needed for military use, the Reveille MOA/ATCAA is scheduled with the ARTCC in advance and IFR civil flights are provided the appropriate IFR separation from military operations.

Since MOA operations are considered nonhazardous, VFR pilots may fly through a MOA when it is in use while exercising see-and-avoid clearance precautions. Military pilots are also aware of other aircraft during their maneuvers, both visually and through use of cockpit radar displays, to identify and remain well clear of nonparticipating air traffic that may be operating in the MOA. Depending upon terrain and an aircraft's position and use of transponder equipment (electronic beacon), aircraft radar displays are capable of detecting aircraft within 100 miles, including smaller general aviation aircraft. VFR pilots can obtain MOA use status and radar traffic advisories from Nellis AFB ATC while operating within this airspace.

Military Training Routes

Nellis AFB, 57th Operational Support Squadron is the scheduling unit for two military training routes (MTRs) that lie partially within NTTR airspace, Instrument Route (IR)-286 and Victor Route (VR)-222. These MTRs are not always used in conjunction with NTTR activities and are flown by various aircraft. The annual number of sorties flown on each of these routes is less than one per day.

Civil and Commercial Aviation Airspace Use

Several federal (also known as Victor) airways and jet routes flown using IFR rules border NTTR airspace (Figure 3.2-3) and provide nearly direct routing between key airports in the west and midwest. When air traffic control routes this traffic through NTTR airspace, separation is provided from all military operations. Two public airports or airfields underlie the MOA portions of the NTTR airspace; several airports occur near NTTR. Neither of the two underlying airfields has over 1,000 aircraft operations a year (AirNav 2010). Surrounding airfields range from about 15,000 operations per year at Mesquite to 10 at Lida Junction. These operations are minimal compared to the over 652,000 annual operations at McCarran and North Las Vegas airports (AirNav 2010).

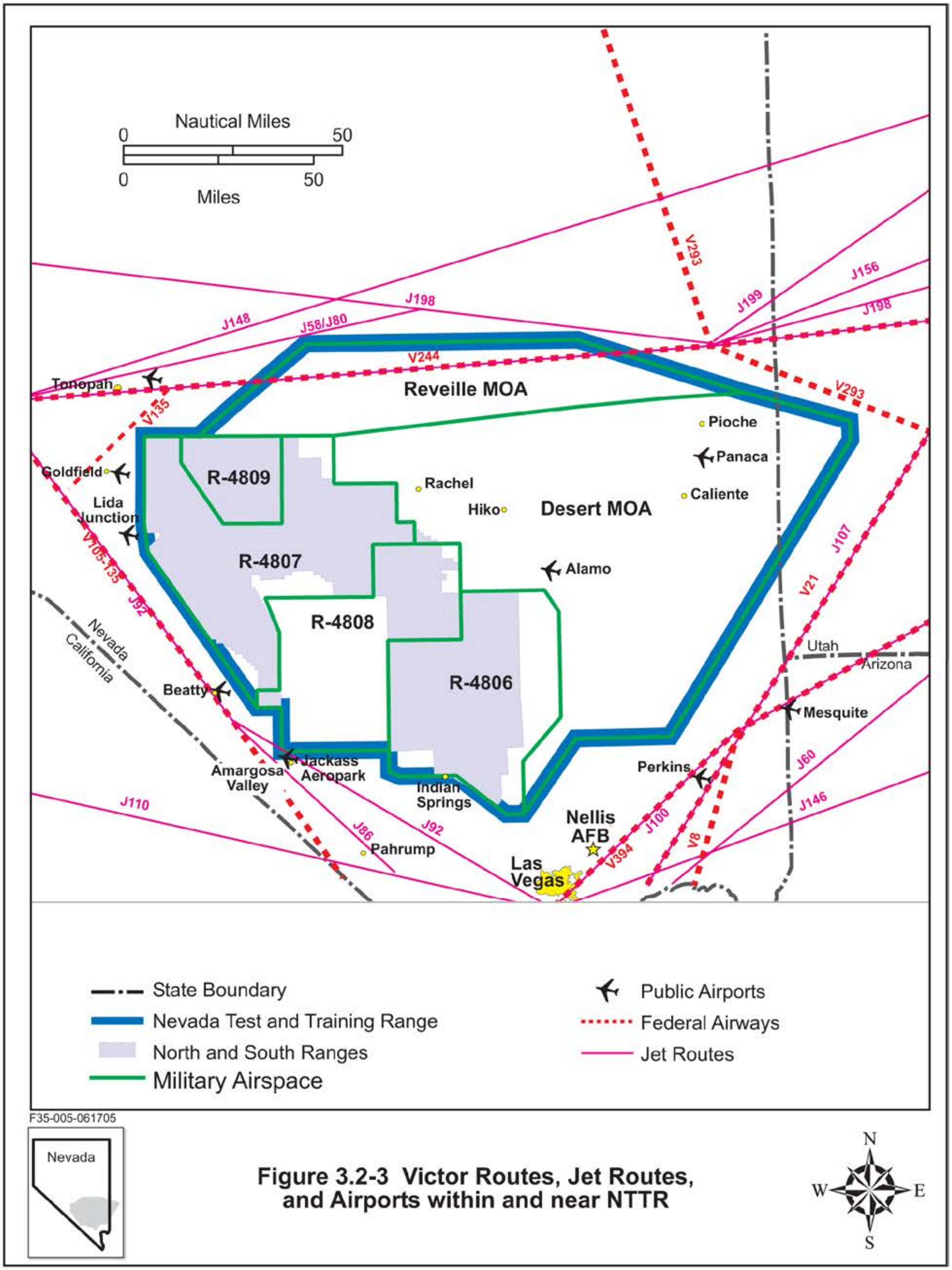


Figure 3.2-3 Victor Routes, Jet Routes, and Airports within and near NTTR

Commercial aircraft activity in Nevada has increased considerably and is expected to continue to grow over the next 20 years (NDOT 2005). Most of this present and anticipated growth is at the Las Vegas and Reno airports. According to the 2005 Nevada Aviation System Plan, commercial operations were expected to increase 54 percent; general aviation activity was expected to grow by about 17 percent by 2015 (NDOT 2005); and McCarran International Airport would exceed its stated capacity by 2008 (NDOT 2005). However, due to the economic downturn, this growth was not recognized and operations at McCarran have actually decreased since the year 2005. The Nevada Aviation System Plan has not been updated since its publication in 2005.

Aircraft operating under VFR between any of the airports in the Las Vegas area or airfields adjacent to NTTR airspace must either remain clear of restricted airspace or may fly through the Desert and Reveille MOAs. Nellis AFB operations/airspace representatives provide periodic briefings to area civil aviation pilots on military aircraft operations as part of the ongoing Midair Collision Avoidance Program.

The USFWS conducts periodic flights in the DNWR for aerial census and tracking of bighorn sheep and maintenance of water facilities. These flights occur during the spring and fall, about three to five times a year, and are coordinated through the Nellis AFB range control and scheduling functions (personal communication, Schofield 2005).

3.3 NOISE

The effect of aircraft noise from the F-35 beddown was one of the most predominant questions expressed during the EIS scoping period. Concerns regarding aircraft noise related to certain potential impacts such as hearing loss, non-auditory health effects, annoyance, speech and sleep interference, and effects on animals and wildlife, structures, and historical and archaeological sites. Noise levels from aircraft in residential areas near Nellis AFB and the potential for sonic booms in NTTR were also common concerns.

Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Response to noise varies by the type and characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or mobile sources. Although aircraft are not the only source of noise in any area, they are readily identifiable to those affected by their noise emissions and are routinely singled out for special attention and criticism.

There are two kinds of noise discussed in this EIS. The first is conventional subsonic noise, as generated by an aircraft's engines and airframe. This is the most familiar form of aircraft noise, and is heard while an aircraft is within some distance of a receiver. The second type of noise is supersonic. Sonic booms are brief impulsive sounds, which are generated by the aircraft when it flies faster than sound. Supersonic flight by many different types of aircraft occurs regularly within approved NTTR airspace.

Assessment of subsonic and supersonic aircraft noise requires a general understanding of the measurement and effects of these two kinds of noise. Refer to Appendix C for an explanation of concepts that are briefly defined in this section, and for additional discussion of noise measurements and effects.

Noise represents the most identifiable concern associated with aircraft operations. Although communities and even isolated areas receive more consistent noise from other sources (e.g., cars, trains, construction equipment, stereos, wind), noise generated by aircraft overflights often receives the greatest attention. General patterns concerning the perception and effect of aircraft noise have been identified, but attitudes of individual people toward noise are subjective and depend on their situation when exposed to noise. Annoyance is the primary consequence of aircraft noise. The subjective impression of noise and the disturbance of activities are believed to contribute significantly to the general annoyance response. A number of non-noise related factors have been identified that may influence the annoyance response of an individual. These factors include both physical and emotional variables.

Personal opinions on noise vary widely. For example, one person might consider rock music as pleasing but opera music as offensive. A second person may perceive just the opposite. Likewise, opinions on noise associated with military overflights vary from positive to negative.

Aircraft Noise Assessment Methods

An assessment of subsonic and supersonic aircraft noise requires a general understanding of how sound is measured and how it affects people and the natural environment. While Appendix C provides a detailed discussion of noise and its effects on people and the environment, the primary information needed to understand the noise analysis is summarized below.

Noise is represented by a variety of quantities, or "metrics." Each noise metric was developed to account for the type of noise and the nature of the receptor exposed to the noise. Human hearing is more sensitive to medium and high frequencies than to low and very high frequencies, so it is common to use "A-weighted" metrics, which account for this sensitivity. Impact of impulsive, supersonic noise depends on factors other than human hearing, so that is often quantified by "C-weighted" metrics.

Different time periods also play a role with regard to noise. People hear the sound that occurs at a given time, so it is intuitive to think of the instantaneous noise level, or perhaps the maximum level that occurs during an aircraft flyover. However, the effects of noise depend on the total noise exposure over a period of time. Therefore, "cumulative" noise metrics are used to assess the impact of ongoing activities (like aircraft operations at Nellis AFB and NTTR).

Within this EIS, A-weighted levels are used for subsonic aircraft noise and are described by the sound level (L), the Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL), and Onset Rate-Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). C-weighted levels are used for supersonic aircraft noise (sonic booms) and other impulsive noises. A "C" is included in the symbol to denote when C-weighting is used. Each of these metrics is summarized below and discussed in more detail in Appendix C.

- Sound Level is the amplitude (level) of the sound that occurs at any given time. When an aircraft flies by, the level changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, then decreases to ambient as the aircraft flies into the distance. Sound levels occur on a logarithmic decibel (dB) scale; a sound level that is 10 dB louder than another will be perceived as twice as loud.
- Sound Exposure Level accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total sound exposure for an entire event.
- Maximum Sound Level (L_{max}) is the highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. L_{max} defines the maximum sound level occurring for a fraction of a second.

- Day-Night Average Sound Level is a noise metric combining the levels and durations of noise events, and the number of events over a 24-hour time period. It is a cumulative average, computed over a given time period like a year, to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10-dB penalty for sounds after 10:00 p.m. and before 7:00 a.m. DNL is the measure used to appropriately account for total aircraft noise exposure around airfields such as Nellis AFB.
- Onset Rate Adjusted Monthly Day-Night Average Sound Level is the measure used for subsonic aircraft noise in military airspace like NTTR. L_{dnmr} accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder than its actual level. Penalties of up to 11 dB are added to account for this onset rate.
- C-Weighted Day-Night Average Sound Level (CDNL) is the day-night sound level computed for areas subject to sonic booms, such as portions of NTTR.

Assessing Aircraft Noise Effects

Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on a perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects. Schultz (1978) showed a consistent relationship between noise levels and annoyance. In 1991, a study reaffirmed this relationship (Fidell *et al.* 1991) and in 1994, Finegold updated the form of the curve fit and compared it with the original Schultz curve (Finegold *et al.* 1994). The updated fit, which does not differ substantially from the original, is the current preferred form (see Appendix C).

Factors Influencing Annoyance
Physical Variables
• Type of neighborhood • Time of day • Season • Predictability of noise • Control over the noise source • Length of time an individual is exposed to a noise
Emotional Variables
• Feelings about the necessity or preventability of the noise • Judgment of the importance and value of the activity that is producing the noise • Activity at the time an individual hears the noise (conversation, sleep, recreation) • Attitude about the environment • General sensitivity to noise • Belief about the effect of noise on health • Feeling of fear associated with the noise

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent

variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

In addition to annoyance, this EIS also used other noise metrics and analyses to supplement the DNL evaluations. They include analyses of Potential Hearing Loss, speech interference, and sleep interruption.

Potential Hearing Loss. Noise-related hearing loss risk has been studied extensively. Findings of studies and resulting policies and regulations are discussed briefly below and in more detail in Appendix B. As per DoD policy memorandum (2009) populations exposed to noise greater than 80 dB DNL are at the greatest risk of PHL (Undersecretary of Defense for Acquisition Technology and Logistics 2009). The DoD policy directs that hearing loss risk should be assessed using the methodology described in USEPA Report No. 550/9-82-105, Guidelines for Noise Impact Analysis (USEPA 1982). USEPA's Guidelines for Noise Impact Analysis quantify hearing loss risk in terms of Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in the threshold level below which a sound cannot be heard. NIPTS is stated in terms of the average threshold shift at several frequencies that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week.

The actual value of NIPTS for any given person depends on that individual's physical sensitivity to noise—over a 40-year working lifetime, some people will experience more loss of hearing than others. The actual noise exposure for any person living in an area subject to 80 dB DNL or greater is determined by the time that person is outdoors and directly exposed to the noise. For example, noise exposure within an 80 dB noise contour near an airfield would be affected by whether a person were at home during the daytime hours when most flying occurs. Many people would be inside their homes and would, therefore, be exposed to lower noise levels due to noise attenuation provided by the house structure. For the purpose of this analysis, residents were assumed to be fully exposed to the DNL level of noise calculated for their residence location. The analysis examined the number of people affected by 80 dB DNL or greater in 1 dB increments.

Workplace Noise. In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dB as an 8-hour time-weighted average. This exposure limit was reevaluated in 1998 when NIOSH made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss (NIOSH 1998). Following the reevaluation using a new risk assessment technique, NIOSH published another criteria document in 1998 which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active-duty and reserve components of the Air Force (including the ANG), as well as civilian employees and contracted personnel working on Air Force bases and Air Guard stations must comply with Occupational Safety and Health Administration (OSHA) regulations (29 CFR § 1910.95 *Occupational Noise Exposure*), DoD Instruction

6055.12, *Hearing Conservation Program*; Air Force Occupational Safety and Health (AFOSH) Standard 48-20 (June 2006), and *Occupational Noise and Hearing Conservation Program* (including material derived from the International Standards Organization 1999.2 *Acoustics-Determination of Occupational Noise Exposure and Estimation of Noise Induced Impairment*). Per AFOSH Standard 48-20, the Hearing Conservation Program is designed to protect workers from the harmful effects of hazardous noise by identifying all areas where workers are exposed to hazardous noise. The following are main components of the program:

1. Identify noise hazardous areas or sources and ensure these areas are clearly marked.
2. Use engineering controls as the primary means of eliminating personnel exposure to potentially hazardous noise. All practical design approaches to reduce noise levels to below hazardous levels by engineering principles shall be explored. Priorities for noise control resources shall be assigned based on the applicable risk assessment code. Where engineering controls are undertaken, the design objective shall be to reduce steady-state levels to below 85 dBA, regardless of personnel exposure time, and to reduce impulse noise levels to below 140 dB peak sound pressure level.
3. Ensure workers with an occupational exposure to hazardous noise complete an initial/reference audiogram within 30 days from the date of the workers' initial exposure to hazardous noise.
4. Ensure new equipment being considered for purchase has the lowest sound emission levels that are technologically and economically possible and compatible with performance and environmental requirements. 42 USC Section 4914, *Public Health and Welfare, Noise Control, Development of Low-Noise Emission Products,* applies.
5. Education and training regarding potentially noise hazardous areas and sources, use and care of hearing protective devices, the effects of noise on hearing, and the Hearing Conservation Program.

Speech Interference. Speech interference comprises one supplemental indicator of noise effects. Such interference is measured by the numbers of average daily indoor daytime (7:00 a.m. to 10:00 p.m.) events per hour subject to indoor maximum sound levels of at least 50 dB L_{max} at representative locations. This measure also accounts for 15 dB or 25 dB of noise attenuation provided by buildings such as houses and schools with windows open or closed, respectively. Since modeling accounts for outdoor noise levels only, these data are represented as NA75L_{max} (windows closed) and NA65 L_{max} (windows open). NA means "number of events above", so this analysis examines the number of annual average daily overflight events whose L_{max} would be greater than or equal to 65 dB and 75 dB.

A special case of speech interference deals with classroom interference at schools. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (equivalent noise level [L_{eq}]) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to

an outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 dB and 75 dB serve as the measure of potential classroom effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 a.m. and 4:00 p.m. rather than between 7:00 a.m. and 10:00 p.m. for standard speech interference.

Sleep Disturbance. Noise-related awakenings form another issue associated with aircraft noise. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors including age, gender, sleep stage, noise level, frequency of noise occurrences, noise quality, and pre-sleep activity. Quality sleep is recognized as a factor in good health. Although considerable progress has been made in understanding and quantifying noise-induced annoyance in communities, quantitative understanding of noise-induced sleep disturbance is less advanced.

A study of the effects of nighttime noise exposure on the in-home sleep of residents near a military airbase, near a civil airport, and in several households with negligible nighttime aircraft noise exposure, revealed SEL as the best noise metric predicting noise-related awakenings. It also determined that out of 930 subject nights, the average spontaneous (not noise-related) awakenings per night was 2.07 compared to the average number of noise-related awakenings per night of 0.24 (Finegold *et al.* 1994). Additionally, a 1995 analysis of sleep disturbance studies conducted both in the laboratory environment and in the field (in the sleeping quarters of homes) showed that when measuring awakening to noise, a 10-dB increase in SEL was associated with only an 8 percent increase in the probability of awakening in the laboratory studies, but only a 1 percent increase in the field (Pearsons *et al.* 1995). Pearsons also reports that even SEL values as high as 85 dB produced no awakenings or arousals in at least one study. This observation suggests a strong influence of habituation on susceptibility to noise-induced sleep disturbance. A 1984 study (Kryter 1984) indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of exposed individuals.

To assess the potential for sleep disturbance, the analysis uses SEL as the metric and calculates the probability of being awakened at least once from overflights occurring between 10:00 p.m. and 7:00 a.m. when most people sleep. The SEL from each overflight is based on the particular type of aircraft, flight track, power setting, speed, and altitude relative to the residential receptor. The analysis also accounts for standard building attenuation of 15 dB and 25 dB with windows open and closed, respectively. When summed, the probability of being awakened for a given location is determined.

Affected Environment

Federal, state, and local governments regulate noise to prevent noise sources from affecting noise-sensitive areas, such as residences, hospitals, and schools, and to protect human health and welfare. Both the Nevada Department of Transportation (NDOT) and the Federal Highway Administration require noise control devices such as sound walls when new highway projects generate sound levels that adversely affect sensitive land uses. Federal agencies, such as the Department of Housing and Urban Development, have established health-based maximum noise exposure recommendations. Local agencies, including cities and counties, are responsible for defining and enforcing land use compatibility in various noise environments. The Air Installation Compatible Use Zone (AICUZ) program is the Air Force's vehicle for presenting their noise environment at airfields such as Nellis AFB (Air Force 2004c).

The AICUZ program at Nellis AFB promotes compatible land development in areas subject to aircraft noise and accident potential. Clark County has incorporated the AICUZ recommendations as an integral part of their comprehensive planning process which is regulated in the Clark County Unified Development Code, Title 30, Section 30.48, Part A, *Airport Environs Overlay District*, adopted originally on June 21, 2000 (with updates in 2004), under the authority of Chapter 278, Planning and Zoning, of the Nevada Revised Statutes. Noise compatibility and airport environs implementing standards have also been adopted and found in the Clark County *Airport Environs Report*, an amendment of the Clark County Comprehensive Plan (Clark County 2007).

AICUZ noise contours were developed using the following data: aircraft types, runway utilization patterns, engine power settings, altitude profiles, flight track locations, airspeed, number of operations per flight track, engine maintenance, and time of day. These data were based on a representative day of airfield activity, evaluated over a 24-hour period, when the airfield was in full operation. The advantage of this approach is that it is unaffected by daily, monthly, and yearly fluctuations in the tempo (rate) of use by individual aircraft at the base. The AICUZ study at Nellis AFB employed the NOISEMAP computer-aided modeling approach which is the Air Force's approved program to model subsonic aircraft noise.

3.3.1 Nellis AFB

Sound levels from flight operations at Nellis AFB exceeding ambient background noise typically occur beneath main approach and departure corridors and in areas immediately adjacent to aircraft parking ramps and staging areas. As aircraft take off and gain altitude, their contribution to the noise environment drops to levels indistinguishable from the ambient background. The altitude at which the noise becomes indistinguishable varies depending on the aircraft and meteorological conditions.

Baseline noise levels used in this section and Chapter 4.3 were described in the 2004 Nellis AFB AICUZ Report (Air Force 2004e). These contours reflect F-22A flight information as well as consideration of efforts to reduce noise in the vicinity of Nellis AFB. The AICUZ study identified noise levels ranging from 65 dB DNL to greater than 80 dB DNL for the lands encompassing Nellis AFB; this analysis also considered noise levels of 85 dB DNL and greater (Figure 3.3-1). Total acreage of areas affected by these noise levels is shown in Table 3.3-1.

Table 3.3-1 Baseline Noise (dB DNL) Contours for Nellis AFB and Environs*

	65-70	***70-75***	***75-80***	***80-85***	***>85***	***Total***
Total Acres	8,882	4,787	2,202	1,066	1,161	18,098
Acres within Nellis AFB	1,819	1,540	1,474	1,004	1,161	6,998
Acres outside Nellis AFB	7,063	3,247	728	62	0	11,100
Percent inside Nellis AFB	20%	32%	67%	94%	100%	39%

**Note:* In Chapters 3.6 and 4.6, Land Use, the Clark County planning contours are used to estimate potential impacts to land use and zoning and differ from those presented here.

Areas affected by greater than 85 dB DNL occur within Nellis AFB, with most of the on-base lands exposed to 75 to 85 dB DNL noise levels (Table 3.3-1). For off-base areas, noise levels range from 65 dB DNL to greater than 80 dB DNL. Per the AICUZ, noise levels exceeding 85 dB DNL fall within base boundaries and areas exposed to 80 to 85 dB DNL noise levels are primarily (94 percent or 1,004 acres out of 1,066) found on base. The majority of areas exposed to noise levels of 65 to 80 dB DNL are found outside base boundaries.

In Table 3.3-2, noise levels for representative locations are presented, and are also shown in Figure 3.3-1. These representative locations were derived by first defining the central point within each of the census blocks (a block is the smallest level of geography designated by the U.S. Census Bureau to approximate populations within actual city street blocks in urban areas); about 50 points were identified. Because there were several that fell within the same contour bands and/or were located within unpopulated areas, the representative locations were narrowed down to 20. This number better represents populated areas, limits redundancies, and provides a reasonable indication of impacts to the populace. As depicted in the table, two locations (1 and 11) are found within contour band 75 to 80 dB DNL, while the remainder is affected by noise levels ranging from 60.1 dB DNL to 72.3 dB DNL. Seven representative locations are subject to less than 65 dB DNL.

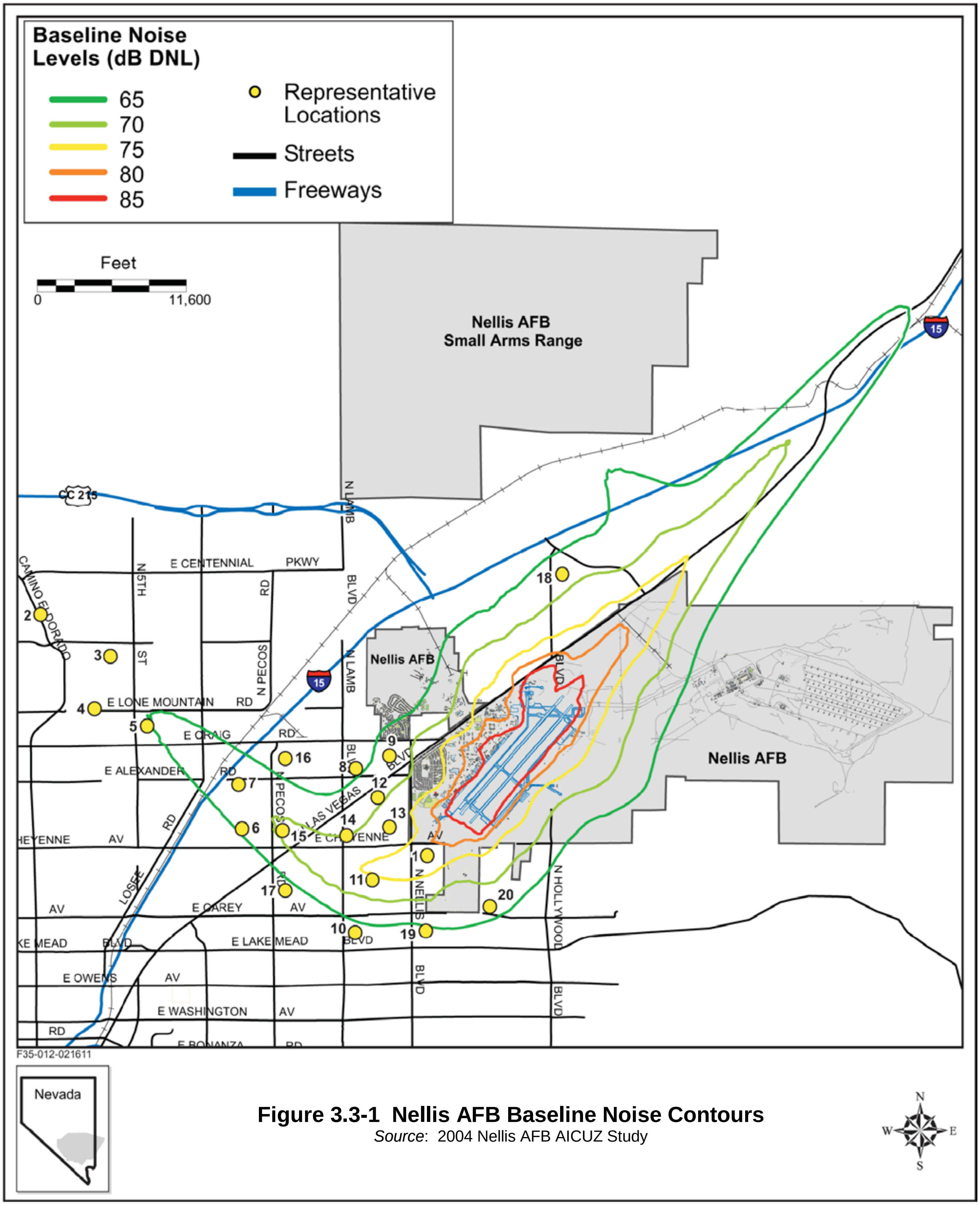


Figure 3.3-1 Nellis AFB Baseline Noise Contours

Source: 2004 Nellis AFB AICUZ Study

Table 3.3-2 Day-Night Average Sound Level for Representative Locations			
Location ID	***dB DNL***	***Location ID***	***dB DNL***
1	79.0	11	75.3
2	60.1	12	69.9
3	62.9	13	72.3
4	62.3	14	70.1
5	65.4	15	71.0
6	67.0	16	62.5
7	68.4	17	64.1
8	64.9	18	68.1
9	67.7	19	64.5
10	64.0	20	67.2

In assessing PHL, the use of DNL to characterize noise exposure provides a conservative assessment of hearing loss risk, as DNL includes a 10-dB weighting factor for environmental nighttime operations between 10:00 p.m. and 7:00 a.m. (local time). Under baseline conditions, on-base populations in dormitories are exposed to noise contour bands 80 dB and greater; however, no off-base residential populations are affected by these noise levels. No PHL results from exposure within the dormitories because personnel are not inhabiting these buildings for the 40-year duration defined in the supplemental PHL metric.

Speech interference comprises another indicator of noise effects. Such interference is measured by the number of average daily indoor daytime and evening (7:00 a.m. to 10:00 p.m.) events per hour subject to indoor maximum sound levels of at least 50 dB for the representative receptors (Table 3.3-3). This measure also considers the effect of noise attenuation provided by buildings with the windows open (15 dB) or closed (25 dB). Using the same representative locations already identified, it is estimated that when windows are closed, the average number of potential speech interfering events range from a high of 10 to a low of 3 across the 20 receptors. When windows are open, the average interference events range from a high of 14 to a low of 6 per hour.

Table 3.3-3 Baseline Indoor Speech Interference for Representative Residential Locations Near Nellis AFB					
Location ID	**Average Daily Indoor Daytime (7:00 a.m. – 10:00 p.m.) Events per Hour***				
	Windows Closed	***Windows Open***	***Location ID***	***Windows Closed***	***Windows Open***
1	10	14	11	7	11
2	4	6	12	7	12
3	4	6	13	8	12
4	4	6	14	5	10
5	5	6	15	4	8
6	4	7	16	3	7
7	4	7	17	4	7

Table 3.3-3 Baseline Indoor Speech Interference for Representative Residential Locations Near Nellis AFB					
	Average Daily Indoor Daytime (7:00 a.m. – 10:00 p.m.) Events per Hour*				
Location ID	***Windows Closed***	***Windows Open***	***Location ID***	***Windows Closed***	***Windows Open***
8	5	10	18	6	12
9	7	11	19	5	10
10	6	11	20	6	11

*Assumes a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

As detailed in Appendix C, sleep disturbance also serves as a measure of noise conditions. Table 3.3-4 lists the probabilities of indoor awakening from average nighttime (10:00 p.m. to 7:00 a.m.) events for the representative locations with windows closed and open. For windows closed and open, the average nightly percent awakening probability ranges between 9 and 26 percent and 13 and 38 percent, respectively.

Table 3.3-4 Baseline Indoor Sleep Disturbance for Representative Residential Locations near Nellis AFB					
	Average Nightly (10:00 p.m. – 7:00 a.m. Probability of Awakening (%)*				
Location ID	***Windows Closed***	***Windows Open***	***Location ID***	***Windows Closed***	***Windows Open***
1	23%	33%	11	19%	28%
2	11%	16%	12	25%	35%
3	10%	15%	13	23%	34%
4	9%	14%	14	17%	25%
5	9%	13%	15	11%	16%
6	10%	15%	16	11%	17%
7	10%	16%	17	9%	14%
8	17%	26%	18	26%	38%
9	21%	30%	19	19%	27%
10	18%	27%	20	24%	34%

*Assumes a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

To reduce noise over off-base residential areas, Nellis AFB continues to apply the following noise abatement procedures (Air Force 2005c):

1. Night flying – Nellis AFB restricts nighttime flying activities and routes to have the least effect on populated areas.
2. Altitude restrictions – Approach and departure procedures have been modified to increase altitude at various points along the arrival and departure paths.
3. Northbound take-offs – To the extent possible, northbound departures are used during evening hours (10 p.m. until 8 a.m.) and for all aircraft carrying live ordnance.

4. Afterburner take-offs – No unrestricted afterburner take-offs on weekends or holidays, or before 10 a.m. on weekdays. There are limited exceptions for operational missions and essential testing and training.
5. Practice approaches – Jet aircraft practice approaches are authorized only after 9 a.m. daily.

To the maximum extent possible, engine runup locations have been established in areas that minimize noise for those in the surrounding communities, as well as for people on base. Normal base operations do not include late-night (after 10 p.m.) engine runups, but heavy workloads or unforeseen contingencies sometimes require a limited number of these after that time.

Noise due to construction and maintenance equipment, as well as general vehicular traffic, is a common ongoing occurrence in the base environment. Trucks, as well as heavy equipment, are found in the base environment on a daily basis to support existing facility operations and infrastructure upgrades. While all of these sources contribute to the noise environment, their effects rarely extend beyond base boundaries, and aircraft noise dominates the environment.

3.3.2 Nevada Test and Training Range

Definition of aircraft noise levels in an airspace environment requires two sets of data. The first is a quantitative understanding of aircraft operations: numbers of aircraft, their speeds, altitudes, and locations. The second set of data derives from the physical modeling of the noise itself, which is then accumulated for all aircraft operations. Aircraft operations (defined as sortie-operations) in NTTR have been described in Chapter 2 and the numbers used in calculations presented in Appendix B. In NTTR, aircraft operations have historically varied from year-to-year, from a low of 200,000 to a high of 300,000 sortie-operation scenarios. Because of this variation, noise was evaluated at both ends of the spectrum.

To accomplish noise analysis, data defining aircraft activity in terms of time in NTTR airspace, as well as the speed, altitude, power setting, and position information are required. One source of data for this information derives from the NTTR airspace manager, who maintains records on the use of NTTR airspace units. A second data source, the Nellis Air Combat Tracking System (NACTS) was also used in the analysis. This tracking system can record specific flight parameter data for each aircraft during a Red Flag and other test/training exercises. This system was preceded by the Red Flag Measurement and Debriefing System (RFMDS) and the Air Combat Maneuvering Instrumentation (ACMI), both of which provided similar but less robust data. For sonic boom measurements, 6 months of ACMI data were analyzed as part of a sonic boom monitoring study in the Elgin MOA (Frampton *et al.* 1993a). The implications of these data were incorporated into the BOOMAP 96 sonic boom model (Plotkin 1996, Frampton *et al.* 1993b) and applied in this EIS analysis to evaluate the number, nature, and location of sonic booms within NTTR airspace.

NTTR includes MOAs and restricted airspace in which random aircraft operation is the norm or, due to either airspace configuration or training scenarios, operations may be concentrated, or channeled, into specific areas or corridors. In addition, there are MTRs in the region and operations on MTR segments within NTTR airspace are included in the total noise analysis. However, those MTRs that fall outside NTTR airspace were not specifically considered in this analysis.

As mentioned above, subsonic flights within MOAs and restricted airspace often occur randomly and to account for that, the Air Force has developed the MR_NMAP (MOA-Route NOISEMAP) computer software program (Lucas and Calamia 1996). MR_NMAP calculates noise for both random operations and those channeled into MTRs (Lucas *et al.* 1995, Frampton *et al.* 1993c). The primary noise metric calculated by MR_NMAP for this assessment is L_{dnmr} and was used for each of the six airspace units potentially affected by the proposed action and no-action alternative. As discussed above and in Appendix C, this cumulative metric represents the most widely accepted method of quantifying noise impacts. However, it does not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the SEL for individual aircraft at various distances. Figure 3.3-2 shows the SEL noise levels for various aircraft at 1,000 feet AGL; the specific engine type is presented in parentheses. Figure 3.3-3 and Table 3.3-5 present the baseline noise levels for NTTR airspace units described in Section 3.1; cumulative noise levels are all below 65 L_{dnmr}. These baseline noise levels are based on using the F-22A engine parameters and differ slightly from those presented in the F-22 FDE EIS (Air Force 1999a). This difference is due to using the actual F-119 engine for the F-22A in this analysis, but in the previous F-22 FDE EIS, the Air Force applied the best available data available at that time which was an F-18 surrogate—the noise levels for the F119 operational engines were not yet developed in the late 1990s.

Table 3.3-5 Baseline Noise Levels (L_{dnmr}) for NTTR

Airspace Unit	***Baseline- F-22A FDE Sortie-Operations***	
	200,000	*300,000*
Caliente	55	57
Coyote	57	58
Elgin	46	48
Reveille	54	55
4806		
R61	54	55
R62	56	57
R63	56	57
R64	53	54
R65	58	59
Alamo	54	55
EC South	56	57
Pahute	61	63
4807		
R71	60	61
R74	61	63

Table 3.3-5 Baseline Noise Levels (L_{dnmr}) for NTTR

Airspace Unit	*Baseline- F-22A FDE Sortie-Operations*	
	200,000	*300,000*
R75	63	65
R76	61	63
4809A	49	51
EC East	50	51
EC West	49	51
4808W	48	50
4808E	<45	45

Some high performance aircraft using NTTR may fly supersonic. The shape and sound of a sonic boom, resulting from supersonic flight, depend on an aircraft's size, weight, geometry, flight altitude, Mach number (i.e., speed), maneuvering, and atmospheric conditions. Aircraft exceeding Mach 1 always create a sonic boom; however, not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and these layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as “cutoff,” also acts to limit the width (area covered) of the sonic booms that reach the ground.

A sonic boom is characterized as a rapid rise in pressure, followed by a rapid drop-off before the pressure returns to normal atmospheric levels. This change occurs rapidly (i.e., in significantly less than 1 second). The overpressures created are, in the vast majority of cases, well below those that would begin to cause physical injury or structure damage. In rare cases, a sonic boom can cause physical damage, such as to a window, if the overpressure is of sufficient magnitude. During scoping, members of the public commented that sonic booms may also cause startle effects in humans and animals, resulting in safety issues. The Air Force has established procedures for documenting such cases, and for working with affected parties.

Sonic booms from air combat maneuvering activity have an elliptical pattern. Aircraft will set-up at positions up to 100 nm apart, then proceed toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long-term average (CDNL) sonic boom patterns also tend to be elliptical.

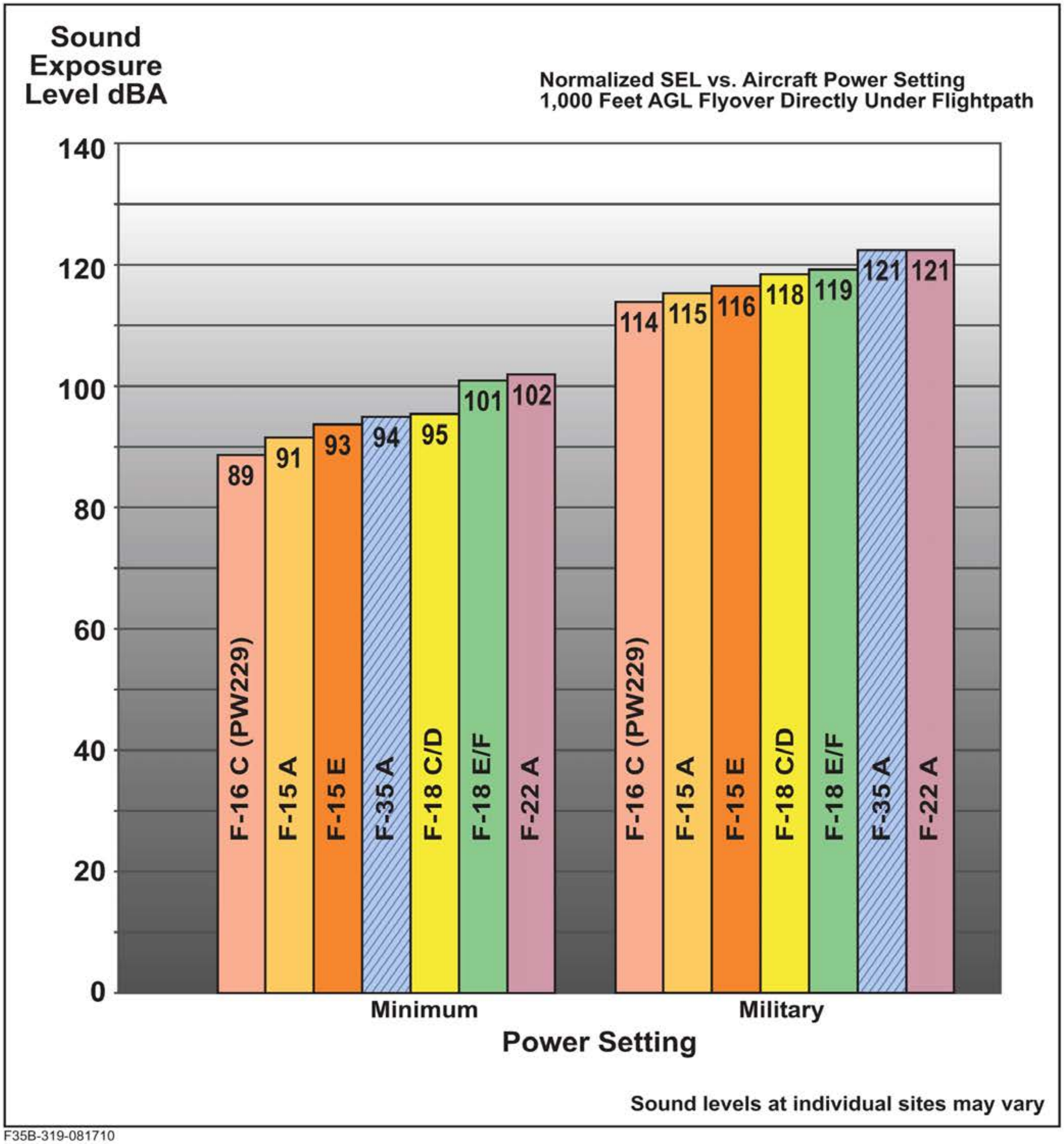


Figure 3.3-2 SEL for Various Aircraft
Source: U.S. Air Force F-35 Joint Program 2007.

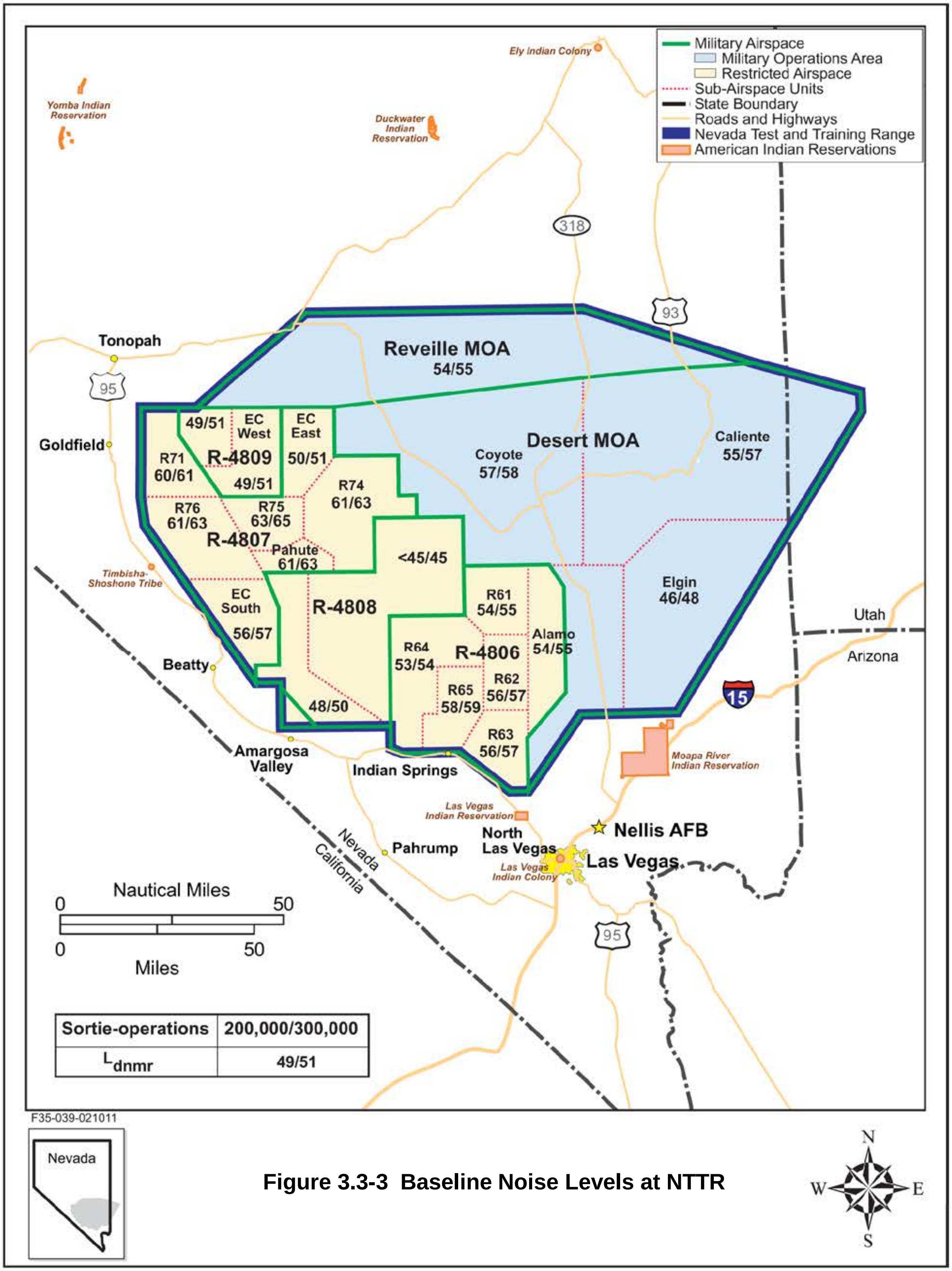


Figure 3.3-3 Baseline Noise Levels at NTTR

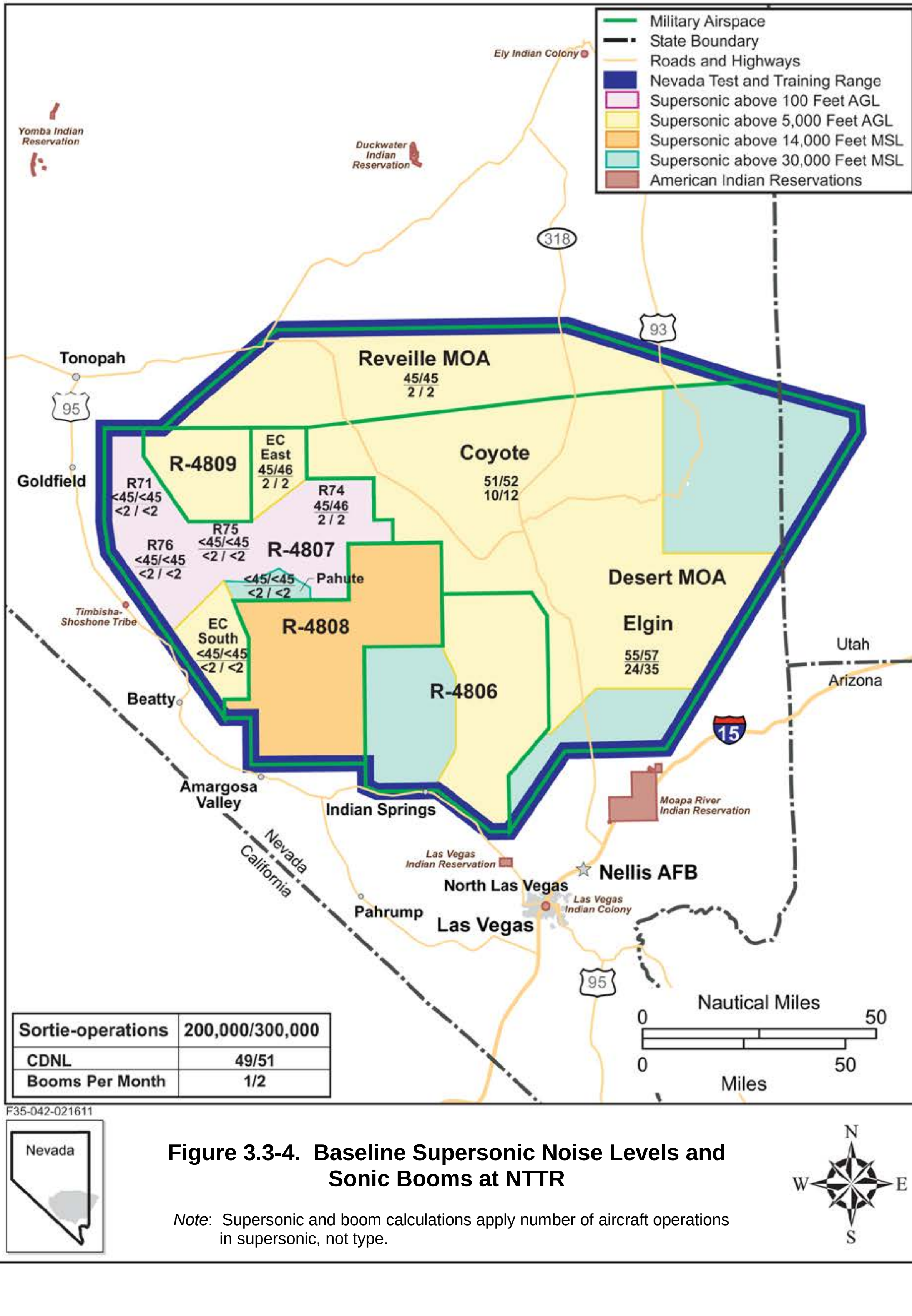
Long-term sonic boom measurement projects have been conducted in four military airspace units: White Sands Missile Range (Plotkin *et al.* 1989), the eastern portion of the Barry M. Goldwater Range (Plotkin *et al.* 1992a), the Elgin MOA at NTTR (Frampton *et al.* 1993a), and the western portion of the Goldwater Range (Page *et al.* 1994). These seminal studies included analysis of schedule and ACMI data and they supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992b). The current version of BOOMAP (Plotkin 1996, Frampton *et al.* 1993b) incorporates results from all four studies.

A variety of aircraft conducting testing and training perform flight activities that include supersonic events. Predominately, these events occur during air-to-air combat, often at high altitudes. Roughly 3 to 10 percent of air-combat maneuvering flight activities, depending upon aircraft type, result in supersonic events within NTTR airspace approved for such events (Frampton *et al.* 1993b).

Figure 3.3-4 and Table 3.3-6 present baseline supersonic noise levels (CDNL) and sonic booms, per month, in NTTR airspace. This includes all of the Reveille MOA and other airspace units authorized for supersonic flight activity: the northern portion of Desert MOA (which includes subunits of Elgin and Coyote MOAs) and other surrounding restricted airspace (subunits of R-4807 that include R-74 and EC East) used for air-combat maneuvering training and air battles as part of flag exercises. As with subsonic noise, levels below 45 dB CDNL are not shown. The values pertain to only those airspace units where supersonic flight is allowed. For more discussion of sonic booms and their effects refer to Appendix C.

Table 3.3-6 Baseline Supersonic Noise Levels (dB CDNL) and Sonic Booms

Airspace Unit	***200,000 Sortie-Operations***		***300,000 Sortie-Operations***	
	dB CDNL	*Booms per month*	*dB CDNL*	*Booms per month*
Elgin	55	24	57	35
Coyote	51	10	52	12
Reveille	45	2	45	2
EC East	45	2	46	2
EC South	<45	<2	<45	<2
Pahute	<45	<2	<45	<2
4807				
R71	<45	<2	<45	<2
R74	45	2	46	2
R75	<45	<2	<45	<2
R76	<45	<2	<45	<2



Sortie-operations	200,000/300,000
CDNL	49/51
Booms Per Month	1/2

Figure 3.3-4. Baseline Supersonic Noise Levels and Sonic Booms at NTTR

Note: Supersonic and boom calculations apply number of aircraft operations in supersonic, not type.

Noise levels less than 45 dB L_{dnmr} are considered low and indistinguishable from most ambient noise conditions and can be influenced by anomalous or unique events. The precise decibel levels are generally unreported, but rather defined as <45 dB or less than 45 dB. The remainder of this EIS uses this convention.

The estimated number of booms per month potentially heard on the ground, at an average location, in each airspace varies from less than 2 to 35, depending upon the number of sortie-operations and the airspace unit. Individual sonic boom footprints would affect areas from about 10 square miles to 100 square miles. The booms per month values account for the total number of booms and the average area affected by each, and represent the number that would be heard, on average, by an individual on the ground under the airspace.

The noise modeling used to calculate supersonic noise levels and sonic booms applies the underlying assumption that within each airspace unit, sonic booms are distributed homogeneously and in a random nature. The modeling cannot account for a normal statistical distribution because the airspace units are oddly shaped in three dimensions, width, length, and altitude. However empirical data, acquired from sonic boom complaints in Alamo and other communities under the airspace, indicate that sonic booms are heard more frequently in some areas more than in others. This result is not unexpected; receptors toward the center of an airspace unit would likely hear more booms than those at the edge of the unit. Therefore, the noise levels indicated in Table 3.3-6 and presented in Figure 3.3-4 may be greater for receptors located toward the central portion of the airspace than those living under the edge of the airspace.

3.4 AIR QUALITY

Understanding air quality for the affected area requires knowledge of: 1) applicable regulatory requirements; 2) types and sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources such as aircraft; 3) location and context of the affected area associated with the proposed action; and 4) existing conditions (or affected environment).

Applicable Regulatory Requirements

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The Clean Air Act (CAA) and its subsequent amendments (CAAA) established the National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants: 1) ozone (O_3), 2) carbon monoxide (CO), 3) nitrogen dioxide (NO_2), 4) sulfur dioxide (SO_2), 5) particulate matter (PM) less than 10 and 2.5 microns (PM_{10} and $PM_{2.5}$), and 6) lead (Pb). These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The Nevada Division of Environmental Protection (NDEP), Bureau of Air Quality (BAQ) has adopted the NAAQS, with the following exceptions: 1) added 3-hour sulfur dioxide as a primary standard (this is a secondary standard under the NAAQS), 2) added standards for visibility impairment and 3) included a 1-hour hydrogen sulfide (H_2S) concentration standard. The national and state ambient air quality standards are presented in Appendix D. Nellis AFB is considered a major source of air emissions and falls under Title V of the CAAA because it emits either 100 tons per year (tpy) of one criteria pollutant (as is the case with Nellis AFB), 10 tpy of a single hazardous air pollutant (HAP), or 25 tpy of total combined HAPs (neither of these HAP thresholds applies to Nellis AFB).

The CAA requires each state to develop a State Implementation Plan (SIP) which is its primary mechanism for ensuring that the NAAQS are achieved and/or maintained within that state. According to plans outlined in the SIP, designated state and local agencies implement regulations to control sources of criteria pollutants. The CAA provides that federal actions in nonattainment and maintenance areas cannot hinder future attainment with the NAAQS and must conform with the applicable SIP (i.e., Nevada SIP). There are no specific requirements for federal actions in unclassified or attainment areas pertaining to mobile and fugitive source emissions. However, Section 176, General Conformity, of the CAA prohibits federal agencies from supporting any activities that do not conform to an approved SIP in nonattainment and maintenance areas.

Conformity means compliance with a SIP for the purpose of attaining or maintaining the NAAQS. Specifically, this means ensuring the federal activity (such as the F-35 proposed beddown) will: 1) not cause a new violation of existing NAAQS, 2) not contribute to an increase in the frequency or severity of

violations of existing NAAQS, or 3) not delay the timely attainment of any NAAQS, interim milestones, or other milestones to achieve attainment. The statutory requirement applies to federal actions in NAAQS nonattainment or maintenance areas only. Under this requirement, certain actions are exempted from conformity determinations, while others are presumed to be in conformity if total project emissions for a given pollutant are below the *de minimis* levels established by regulation. These *de minimis* levels are represented in tons per year. Nellis AFB is located within the Las Vegas Valley of Clark County which is currently in nonattainment for three criteria pollutants: CO, PM_{10}, and 8-hour ozone (the 1997 standard). More detailed discussion of attainment status is presented in Section 3.4.1 below. Because the affected environment falls within areas designated in nonattainment, the analysis must include a review of criteria pollutant emissions to assess whether a conformity determination is needed.

The CAA also establishes a national goal of preventing degradation or impairment in any federally-designated Class I area. As part of the Prevention of Significant Deterioration (PSD) program, mandatory Class I status was assigned by Congress to all national wilderness areas and national memorial parks greater than 5,000 acres and national parks greater than 6,000 acres in existence on August 7, 1977. The PSD program is applicable only to stationary sources such as industrial facilities, not vehicles or aircraft. In Class I areas, visibility impairment is defined as a reduction in visual range and atmospheric discoloration. Stationary sources are typically an issue for visibility within a Class I PSD area. The closest Class I area to the proposed action is Grand Canyon National Park. As part of its Regional Haze Regulation, the USEPA has introduced additional screening criteria in its Best Available Retrofit Technology (BART) guidelines. These criteria are based on a source's annual emission strength and distance from a Class I area (USEPA 2006). The USEPA determined that it would be reasonable to conclude that sources would not be considered to cause or contribute to visibility impairment:

- those located more than 50 kilometers (km) from any Class I area and emit less than 500 tons per year of NO_x or SO_2 (or combined NO_x and SO_2), and
- those located more than 100 km from any Class I area and emit less than 1,000 tons per year of NO_x or SO_2 (or combined NO_x and SO_2).

Types and Sources of Air Quality Pollutants

Pollutants considered in this analysis include the criteria pollutants measured by state and federal standards. These include SO_2 and other compounds (i.e., oxides of sulfur or SO_x); volatile organic compounds (VOCs), which are precursors to (indicators of) O_3; nitrogen oxides (NO_x), which are also precursors to O_3 and include NO_2 and other compounds, CO, PM_{10}, and $PM_{2.5}$. These criteria pollutants are generated by the types of activities (e.g., construction and aircraft operations) associated with the proposed action. Airborne criteria pollutant emissions of lead (Pb) are not included because there are no known significant lead emissions sources in the region or associated with the proposed action and the no-action alternative.

Location and Context

The affected area for air quality can vary horizontally from 0.3 to 2.5 miles (urban scale) up to 2 to 31 miles or more (regional scale), depending on the pollutant being studied. The affected area for air quality also has a vertical dimension because the emissions occur in a volume of air. This vertical dimension depends upon climatic conditions. The upper vertical limits of the affected area equate to the mixing height for emissions, which varies from region to region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable.

For the areas encompassing Nellis AFB and NTTR, the mixing height used is 7,000 feet AGL. This level was determined through coordination with the Clark County Department of Air Quality and Environmental Management (DAQEM) (personal communication, Parker 2007) and based on the annual average mixing height in this region of Nevada.

Greenhouse Gases Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The U.S. Global Change Research Program reports in *Global Climate Change Impacts in the United States* (Federal Advisory Committee 2009) that:

> Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (^{o}F). By 2100, it is projected to rise another 2 to 11.5^{o}F. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily

> counteract some of the human-induced warming, slowing the rise in global temperature; however, these effects would only last a few years.
>
> Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.
>
> Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. Longer ice-free periods on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere, have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7^{o}F. Some of the changes have been faster than previous assessments had suggested.
>
> These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment.

While state-specific impacts are more difficult to predict than large global impacts, the U.S. Global Change Research Program (USGCRP), in its Global Climate Change Impacts in the United States (USGCRP 2009), has evaluated climate change impacts on a regional as well as national basis. This report highlights the following potential impacts for the U.S. Southwest, including Nevada:

- Further water cycle changes are projected, which, combined with increasing temperatures, signal a serious water supply challenge in the decades and centuries ahead.
- Increasing temperature, drought, wildfire, and invasive species will accelerate transformation of the landscape.
- Unique tourism and recreation opportunities that provide important economic benefits to the region are likely to suffer.

- How climate change will affect fire in the Southwest varies according to location. In general, total area burned is projected to increase.
- A warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding.

To minimize GHG impacts, federal agencies and installations will be required to comply with federal climate change policy including EO 13423 (signed January 2007), *Strengthening Federal Environmental, Energy, and Transportation Management*, which instructs federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. EO 13423 also directs federal agencies to implement sustainable practices for energy efficiency and reductions in GHGs, and for the use of renewable energy. The Federal Energy Policy Act requires federal agencies to increase the use of renewable sources by 3 percent between 2007 and 2009, 5 percent between 2010 and 2012, and by 7.5 percent for 2013 and beyond. EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance* (signed October 2009), provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs agencies to increase renewable energy use to achieve general GHG emission reductions. According to provisions in this EO, federal agencies are required to develop a 2008 baseline for scope 1 emissions (which are direct GHG source emissions that are owned or controlled by the agency) and scope 2 emissions (or those emitted indirectly from electricity, steam, or heat purchased by the agency) by FY 2010. The agencies then need to develop a percentage reduction target for agency-wide scope 1 and 2 GHG emissions by FY 2020. As part of this effort, federal agencies need to evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan which prioritizes agency actions based on lifecycle return on investment.

In response to these orders, DoD announced (January 2010) that it will reduce its 2008 GHG scope 1 and 2 emissions from non-combat activities by 34 percent. In June 2010, DoD also committed to reducing scope 3 emissions by 13.5 percent. Per EO 13514, the Air Force will also initiate a comprehensive inventory of GHG emissions, including such emissions associated with FY 2010 operations, by early January 2011, and annually thereafter. The Air Force intends to include emissions from aircraft operations, tactical and highway vehicles, and non-road engines and equipment. The inventory includes all scope 1 and 2 emissions and all measurable scope 3 emissions.

While not directly affecting the proposed action, the USEPA has recently promulgated several final regulations involving GHGs either under the authority of the CAA, or as directed by Congress, a summary is provided below:

USEPA promulgated an endangerment finding involving motor vehicle tailpipe GHG emissions (*Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the*

Clean Air Act, 74 *Federal Register* 66496). For the finding, USEPA determined that GHGs threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat.

Precipitated by the endangerment finding, USEPA and the Department of Transportation's National Highway Traffic Safety Administration finalized a joint rule to establish a national program consisting of new standards that apply to the manufacturers of model year 2012 through 2016 light-duty vehicles that will reduce GHG emissions and improve fuel economy (*Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, 75 *Federal Register* 25324 [2010]).

As a result of the light-duty vehicle rule, USEPA believed that a tailoring rule for PSD and Title V permitting was necessary. The tailoring rule established PSD thresholds for major stationary sources of GHGs (*Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, 75 *Federal Register* 31514). The rule establishes two initial phases in steps. Step 1 began on January 2, 2011, and covers only sources and modifications that would otherwise undergo PSD or Title V permitting based on emissions of non-GHG pollutants. No additional PSD permitting actions or Title V permitting will be necessary solely due to GHG emissions during this period. Sources with Title V permits must address GHG requirements when they apply for, renew, or revise their permits. Step 2 begins on July 1, 2011, and covers new large sources of GHG emissions that have the potential to emit 100,000 tons per year (tpy) equivalent carbon dioxide (CO_2e) or more. GHG emission sources that equal or exceed the 100,000 tpy CO_2e threshold will be required to obtain a Title V permit if they do not already have one.

On February 18, 2010, the CEQ released proposed guidance entitled *NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions.* The proposed guidance suggests that proposed federal actions that would reasonably be anticipated to emit 25,000 metric tons or more of CO_2e GHG emissions should be evaluated by quantitative and qualitative assessments. The proposed guidance suggests that this be considered a minimum level for consideration in NEPA documentation. In the absence, therefore, of a final issuance of guidance from CEQ, the GHG-suggested threshold in the proposed guidance is used in this EIS. GHG emissions comparisons, which would occur from the proposed action, used the 25,000-metric ton level.

Hazardous Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs) which are regulated under Section 112(b) of the 1990 CAAA. The National Emission Standards for Hazardous Air Pollutants (NESHAPs) regulate 188 HAPs based on available control technologies (USEPA 2010).

Some HAPs are associated with diesel and gasoline exhaust. Since these HAPs are emitted from mobile sources, they are called Mobile Source Air Toxics, which include benzene, aldehydes, 1,3-butadiene, and a class of compounds known as polycyclic aromatic hydrocarbons. The USEPA recently promulgated new regulations to reduce the amount of benzene in gasoline and reduce exhaust emissions from passenger vehicles operated at cold temperatures (under 75°F). The reduction in benzene content, from 1 percent to 0.62 percent needs to be implemented by 2011. The USEPA is also requiring new standards to reduce non-methane hydrocarbon exhaust emissions from new gasoline-fueled passenger vehicles. Non-methane hydrocarbons include many mobile source air toxics, such as benzene. The new standards require a maximum non-methane hydrocarbon emission rate of 0.3 grams/mile for vehicles weighing 6,000 pounds or less and 0.5 grams/mile for vehicles above 6,000 pounds (which include trucks up to 8,500 pounds and passenger vehicles up to 10,000 pounds). The standards phase in between 2010 and 2013 for the lighter vehicles, and between 2012 and 2015 for heavier vehicles.

According to conclusions drawn from *Select Source Materials and Annotated Bibliography on the Topic of HAPs Associated with Aircraft, Airports, and Aviation* (FAA 2003), the FAA concluded that:

- Neither aircraft nor airports meet the definitions of the source types that are regulated under Section 112 (*Hazardous Air Pollutants*) of the CAA.
- Emissions from aircraft engines are currently regulated under Section 231 (*Aircraft Emission Standards*) of the federal CAA. Although HAPs are not directly regulated, they are indirectly controlled as elements of total unburned hydrocarbons and particulate matter.
- Airports are characterized under the USEPA National Air Toxics Program as an example of complex facilities that produce aggregates of emissions, including HAPs, from multiple sources.

In addition, the FAA report noted that the most remarkable observations recorded during the testing of aircraft exhaust were: 1) the extremely low concentration of HAPs found in aircraft exhaust considering the amounts of fuel burned, the amounts of energy (or thrust) generated, and the amounts of other products of combustion produced; 2) the type and amounts of HAP emissions are strongly influenced by the engine load, varying by an order-of-magnitude (or more) from taxi/idle to full take-off thrust; and 3) that averaging HAP emission factors from different aircraft and for different operating conditions is not considered appropriate, as there is potential for great variation. For this reason, available aircraft engine emission factors for HAPs may also not be representative of untested aircraft or the aircraft fleet as a whole (FAA 2003).

Currently, Nellis AFB emits a combined total of 4.7 tons of HAPs from all stationary sources (Air Force 2009a). Facilities that generate these emissions include hush houses, fuel cell maintenance building, boilers, and paint booths. Even if total HAPs were doubled (which would not be the case since the proposed action does not call for constructing this number of facilities), Nellis AFB would still not exceed

the 10 tpy threshold for a single HAP nor the threshold of 25 tpy for combined total HAPs. Since HAPs emissions from mobile and stationary sources are not anticipated to be significant or exceed regulatory thresholds, they are not evaluated further in this document.

3.4.1 Nellis AFB

For the proposed action and no-action alternative, the air quality affected environment for Nellis AFB is the Las Vegas Valley. Carbon monoxide occurs in the atmosphere as the result of incomplete combustion of fuels. In Las Vegas, as in other urban areas, motor vehicles form the major source of CO emissions, comprising approximately 88 percent of total daily emissions. During the winter months local inversions stagnate air masses and trap pollutants causing local buildup of CO and thus exceedances of federal air pollution standards. While the Valley may have exceeded federal air quality standards on a seasonal basis, the USEPA determined in 2005 that it was in attainment. Therefore, in 2008 the County submitted a CO Maintenance Plan and request for formal redesignation to USEPA (CC DAQEM 2008a); in September 2010 USEPA approved the Plan and request for redesignation (75 *Federal Register* [FR] 59090, USEPA 2010a).

In terms of PM_{10} status, USEPA determined in August 2010 that the Las Vegas Valley had reached attainment of this criteria pollutant by the applicable date of December 31, 2006 (75 FR 45485, USEPA 2010b). This determination was not a redesignation because the USEPA has not approved an applicable PM_{10} Maintenance Plan; therefore, the Valley remains in serious nonattainment until Nevada meets the CAA requirements for redesignation of the Valley to attainment (75 FR 45485, USEPA 2010b). For ozone, in June 2007 the USEPA determined that areas classified as in nonattainment under Subpart 1 (which applies to the Las Vegas Valley) would not be required to demonstrate attainment in 2007 (CC DAQEM 2008b). This action has obligated Clark County to develop an early progress plan that contains motor vehicle emission budgets that address the ozone standards in advance of a complete attainment demonstration. Progress is demonstrated if projected emissions by June 15, 2009 attainment date (2008 ozone season) are less than emissions in the 2002 base year (CC DAQEM 2008). Clark County (as a revision to the state's ozone SIP) submitted their Ozone Early Progress Plan to USEPA in July 2008 and in May 2009 the USEPA found that the emissions budgets contained therein were adequate to demonstrate progress towards attainment (74 FR 22738, USEPA 2009). In March 2011, Clark County submitted to USEPA the *Ozone Redesignation Request and Maintenance Plan* (CC DAQEM 2011). Upon USEPA approval, emissions goals contained therein will be regulated by the County.

Emissions associated with airfield operations (landing, takeoff, touch-and-go) are calculated based on aircraft activity at the base (Table 3.4-1) (Air Force 1999a). These data include the number of aircraft operations conducted by base-assigned and transient aircraft and apply the same information used to characterize the airfield noise environment.

Table 3.4-1 Summary of Baseline Emissions at Nellis AFB (tons/year)					
Source	***VOCs***	***CO***	***NO_x***	***SO_2***	***PM_{10}***
Ground-Based[1]	13.42	13.50	29.63	1.10	14.4
Aircraft[2]	318	928	444	345	26
Total	**331.4**	**941.5**	**473.6**	**346.1**	**40.4**
Clark County[3]	43,980	306,425	73,360	52,782	46,717
Nellis AFB Percent Contribution	0.7	0.3	0.6	0.6	0.1

Sources: Air Force 2009a, Air Force 1999a, and USEPA 2011.
Note: [1]Ground-based emissions derived from 2009 Air Emissions Inventory (AEI) at Nellis AFB.
[2]Aircraft emissions derived from F-22A Beddown EIS (most recent evaluation of mobile sources).
[3]2005 county emissions retrieved from USEPA Air Data website.

The total annual CO emissions at Nellis AFB represent about 0.3 percent of total CO emissions for Clark County. PM_{10} emissions for Nellis AFB account for about 0.1 percent and both VOCs and NO_x (ozone precursors) represent less than 1 percent of the total Clark County contribution.

The western edge of the Grand Canyon National Park is approximately 97 km from Nellis AFB, which is within the distance limit for implementing additional PSD stationary source requirements. The U.S. National Park Service, Forestry Service, and Fish and Wildlife Service (the Agencies) have collectively concluded that a similar approach to that employed by USEPA in their Regional Haze Rule has merit with respect to new source impacts at Class I areas for air pollution sources with relatively steady emissions throughout each year. However, the Agencies are modifying the size criteria to also include PM_{10} and sulfuric acid mist (H_2SO_4) emissions because those pollutants also impair visibility and contribute to other resource impacts. In addition, rather than the two-step BART test, the Agencies are using a fixed Q/D factor of 10 as a screening criteria for sources located more than 50 km from a Class I area. Therefore, the Agencies will consider a source located more than 50 km from a Class I area to have negligible impacts with respect to Class I if its total SO_2, NO_x, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. Specifically, Q/D is calculated as:

$$Q/D = \frac{(SO_2 + NO_x + PM_{10} + H_2SO_4)\ [\text{tons/year}] * 8{,}760 \text{ hours per year / Number hours actual operations}}{\text{Distance (km) from Class I Area}}$$

Although Nellis AFB is not expected to increase the number of stationary sources or the use of existing stationary sources, this visibility screening criteria was used to assess impacts on visibility to the Grand Canyon National Park due to Nellis AFB generated mobile source emissions. The Q/D for Nellis AFB is calculated using the steady-state values for emissions beginning in 2020 when all 36 F-35 aircraft have arrived. The calculation, ((184.13 + 9.46 + 51.01)*8,760/4,380)/97 = 5.04. Because the result of the equation is less than 10, this screening analysis indicates that visibility should not be significantly impacted by the increased Nellis AFB mobile source operations. Sulfuric acid (H_2SO_4) emissions from Nellis AFB are unknown and were not included in the calculations; however, it is unlikely that inclusion of this emission type would cause the Q/D to exceed 10.

3.4.2 Nevada Test and Training Range

The affected environment for NTTR is Lincoln and Nye County. There are no PSD Class I areas within 100 km of NTTR borders. With the exception of its very southern extent nearest Las Vegas (refer to Figure 2-3), NTTR falls within an area that is unclassified for state and federal air quality standards. The very southern extent (less than 5 percent of NTTR) falls within the Las Vegas Metropolitan Area designated as nonattainment for CO and PM_{10}. Total annual emissions associated with aircraft activity in NTTR were calculated based on scenarios reflecting the range of 200,000 or 300,000 annual sortie-operations (Air Force 1999b). As with the aircraft emissions calculations for the base, aircraft emissions estimates for NTTR used aircraft operation summaries presented in Appendix B. Aircraft activity in NTTR airspace for air quality analysis employs annual sortie-operations, typical engine power settings, and typical altitude distributions for a given aircraft type. Table 3.4-2 provides a summary of estimated aircraft emissions for the low-use 200,000 and high-use 300,000 sortie-operation scenarios.

Table 3.4-2 Summary of Baseline Emissions at NTTR (tons/year)

	VOCs	*CO*	*NO_x*	*SO_x*	*PM_{10}*
Ground-Based[1]	11.64	4.99	22.58	17.74	3.06
Aircraft					
200,000 sortie-operations[2]	26.64	110.5	2,083.1	81.8	35
Total	**24.3**	**115.49**	**2,105.68**	**99.54**	**38.06**
300,000 sortie-operations[2]	35.94	165.6	3,124.4	122.5	52.8
Total	**47.58**	**170.59**	**3,146.98**	**140.24**	**55.86**
Lincoln County[3]	6,846	29,504	2,072	416	5,228
Nye County[3]	1,327	8,174	1,025	125	3,611

Sources: Air Force 2009b, Air Force 2009c, Air Force 1999b, and USEPA 2011.
Note: [1]Ground-based emissions derived from 2009 NTTR AEI and 2009 Creech AFB AEI.
[2]Aircraft emissions best available data from 1999 Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS.
[3]2005 county emissions retrieved from USEPA Air Data website.

In both sortie-operations scenarios, the total emissions for NTTR airspace are dispersed over a volume of air measuring approximately 13,000 cubic miles. Given this volume, very low concentrations of emissions occur. The highest potential for concentration of emissions would occur during low-altitude aircraft activity near ordnance delivery ranges where aircraft make multiple passes, over the same point on the ground, over short periods of time. To evaluate the percent contribution of emissions at low-altitude flight, the Air Force conducted an analysis and presented its conclusions in the Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS (Air Force 1999b). This analysis reasonably reflects baseline conditions within NTTR. The computerized Multiple Aircraft Instantaneous Line Source (MAILS) dispersion model was used to assess concentrations of ground-level pollutants resulting from aircraft flight activities. Using data from overall sortie-operations in NTTR, the analysis employed a conservative scenario of low-altitude flight activities over a range airspace unit. The MAILS modeling results demonstrated that even intensive, low-altitude flight activity over a range within NTTR would not result in exceedances of NAAQS. Within the 5 percent of NTTR coinciding with the area in

nonattainment for CO and PM_{10}, estimated concentrations fall well below nonattainment thresholds: 8.61 tons for CO and 3.41 tons for PM_{10} under the highest use scenario. This measure is only an estimate since the affected area consists of a "corner" of the airspace where aircraft tend to fly less frequently, actual emissions would likely fall below the estimate. As such, emissions from these sortie-operations do not measurably affect nonattainment for any criteria pollutants or present a significant regional contribution in either county.

3.5 SAFETY

This section addresses ground, flight, and munitions safety associated with activities conducted by units stationed at or operating from Nellis AFB. These operations include activities at the base itself, as well as testing and training conducted in the military airspace that collectively comprises NTTR. Ground safety considers issues associated with operations and maintenance activities that support base and range operations, including fire and crash response. For NTTR, safety also considers fire risk and management. Flight safety includes aircraft flight risks such as aircraft accidents, and Bird/Wildlife-Aircraft Strike Hazard (BASH). Munitions safety assesses the management and use of ordnance or munitions associated with air base operations and training activities.

3.5.1 Nellis AFB

Operations and Maintenance

Day-to-day operations and maintenance activities conducted on Nellis AFB are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements. The handling, processing, storage, and disposal of hazardous by-products from these activities are accomplished in accordance with all federal and state requirements applicable to the substance generated. Additional specific data pertaining to hazardous material and waste management are contained in Section 3.11.

Fire and Crash Response

The Nellis AFB military fire department provides fire and crash response. Under current operations, the unit is fully capable of meeting its requirements. There are no identified equipment shortfalls or limiting factors (personal communication, Ridgeway 2005). The base maintains detailed mishap (e.g., aircraft accidents) response procedures to respond to a wide range of potential incidents. These processes assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Initial response to a mishap considers such factors as rescue, evacuation, fire suppression, safety, and elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. After all required actions on the site are complete, the base civil engineer ensures cleanup of the site.

Aircraft Mishaps

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of mid-air collisions, collisions with structures or terrain, weather-related

accidents, mechanical failure, or pilot error. Flight risks apply to all aircraft; they are not limited to the military.

The Air Force defines four categories of aircraft mishaps: Classes A, B, C, and E/High Accident Potential[1]. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, destruction of an aircraft, or damage to an aircraft beyond economical repair (DoD 2009). Class B mishaps result in total costs of more than $500,000, but less than $2 million, or result in permanent partial disability. Class C mishaps involve costs of more than $50,000, but less than $500,000, or a loss of worker productivity of more than 8 hours. Class E/High Accident Potential represent minor incidents not meeting any of the criteria for Class A, B, or C. Class C mishaps form the most common occurrences, primarily involving minor damage and injuries, but rarely affecting property or the public.

Major considerations in any accident are loss of life and damage to property. It is impossible to predict the precise location of an aircraft accident. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant: first, FAA regulations instruct pilots to avoid direct overflight of population centers at very low altitudes; second, the brief amount of time the aircraft is over any specific geographic area limits the probability of a disabled aircraft impacting a specific populated area; and third, design and location of the clear zone (CZ) and accident potential zones (APZs) identify areas subject to higher risk from a crash.

The Air Force designed a program for installations to minimize aircraft operational impacts on local communities. The study supporting this program is known as the AICUZ study (as first discussed in Section 3.3). The purpose of the AICUZ program is to promote compatible land development in areas subject to aircraft accident potential and noise. Air Force AICUZ land use guidelines reflect land use recommendations for CZ and APZ I and II. The guidelines recommend land uses which are compatible with airfield operations while allowing maximum beneficial use of adjacent properties.

The CZs, each measuring 4,000 feet wide by 3,000 feet long, extend directly from the ends of the runways. At Nellis AFB, the CZs are wholly contained within the base boundaries and permit no development (Figure 3.5-1). APZ I represents an area beyond the CZ with a significant potential for accidents, but less than the CZ. To the northeast, APZ I measures 4,000 feet wide by 5,000 feet long and lies within the base. On the southwest, APZ I extends off-base from the CZ with westward and southwestern arms associated with flight patterns.

[1] Class D mishaps do not apply to aircraft.

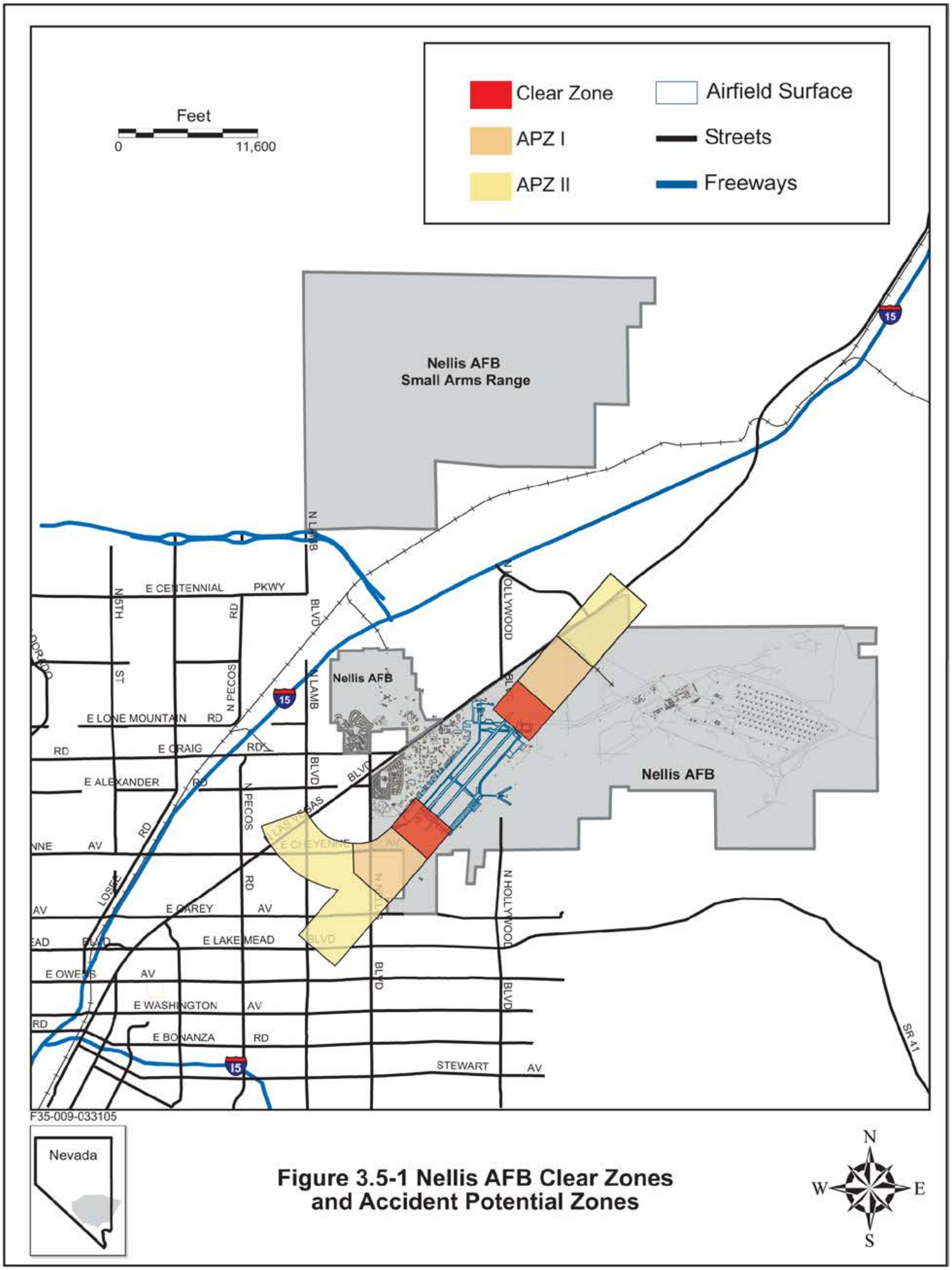


Figure 3.5-1 Nellis AFB Clear Zones and Accident Potential Zones

APZ II, which has the lowest potential for aircraft accidents, extends beyond APZ I and measures 4,000 feet wide by 7,000 feet long. About 70 percent of the northeastern APZ lies within the base boundaries; and the southwest APZ II lies entirely off-base.

Secondary effects of an aircraft crash include the potential for fire and environmental contamination. Again, because the extent of these secondary effects is dependent on the situation, they are difficult to quantify. When an aircraft crashes, it may release petroleum, oil, and lubricants that may not all be consumed in a fire and could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. On Nellis AFB and nearby, the soils are not very permeable. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Aircraft flight operations from Nellis AFB are governed by flight standard rules. Specific procedures for the base are contained in standard operating procedures that must be followed by all aircrews operating from the installation (Air Force 2005c). In the last 5 years, there have been two Class A aircraft accidents on Nellis AFB, while over 340,000 airfield operations have been conducted (personal communication, 57 WG/SEF 2006).

Bird/Wildlife-Aircraft Strike Hazard

BASH constitutes a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. Aircraft may encounter birds at altitudes of 30,000 feet MSL or higher; however, over 95 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 50 percent of bird strikes happen in the airport or airfield environment, and 25 percent occur during low-altitude flight training (Worldwide BASH Conference 1990).

Migratory waterfowl (e.g., ducks, geese, and swans) pose the most hazard to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. The potential for bird-aircraft strikes is greatest during spring and fall migratory seasons in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

Although waterfowl are the greatest threat, raptors, shorebirds, gulls, herons, and songbirds also pose a hazard. Peak migration periods for raptors, especially eagles, are from October to mid-December and from mid-January to the beginning of March. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors. Songbirds (small birds, usually less than one pound) usually migrate at night along major rivers, typically between 500 to 3,000 feet AGL.

For aircraft conducting airfield operations at or near Nellis AFB, the bird-aircraft strike data maintained by the base indicate that from 1987 through 2001, aircraft have experienced 233 bird strikes. Given that airfield operations at Nellis AFB exceeded 1,000,000 during that same period, the occurrence of bird/wildlife-aircraft strikes in the airfield environment was very low. Nellis AFB and its vicinity include no migration corridors or areas supporting major concentrations of birds. The majority of these bird-aircraft strikes (56.3 percent) occurred at altitudes of 1,000 feet AGL or less. Of this total, 12 percent were classified as Class C mishaps; there were no Class A or Class B mishaps (personal communication, 57 WG/SEF 2005).

Munitions Use and Handling

Personnel at Nellis AFB control, maintain, and store all ordnance and munitions required for mission performance. This includes inert bombs and rockets, live bombs and rockets, chaff, flares, large and small arms ammunition, and other explosive and pyrotechnic devices. Munitions are handled and stored in accordance with Air Force explosive safety directives (Air Force 2001a), and all munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data. The airfield also has specific areas designated for live ordnance loading, parking of aircraft loaded with live ordnance, and arming and dearming of ordnance and guns (Air Force 2005c). There are two live ordnance loading areas, LOLA north and south (Figure 3.5-2). Both are located to the east of Runway 03 Right/21 Left. The "hot cargo" pad is located at the northern end of the flightline, just east of Runway 03 Right/21 Left (Figure 3.5-2). Arm/dearm pads are located at the north and south ends of the flight line, and immediately adjacent to the ends of the runways. If a malfunction prevents ordnance release during a mission, and the pilot must return to the base with "hung" ordnance (i.e., any ordnance of which an attempt to release, jettison, launch, or fire from an aircraft did not actuate as designed), the aircraft is parked in revetments in the hung ordnance area while the ordnance is rendered safe. This area is located east of Runway 03 Right and south of the LOLA (Air Force 2005c). Sufficient storage facilities exist for current types and amounts of ordnance, and all facilities are approved for the ordnance they store.

3.5.2 Nevada Test and Training Range

Fire Risk and Management

The Nellis AFB military fire department provides fire and crash response by convoy to those ranges within NTTR that are close to Nellis AFB. The unit is fully equipped and staffed with qualified personnel. There are no identified equipment shortfalls or limiting factors (personal communication, Ridgeway 2005). Elements of the fire department are dispersed throughout NTTR, and would respond to range fires on DoD-withdrawn lands. If required, additional response support could be provided by BLM in accordance with a memorandum of agreement. Fire suppression of wildland fires on NTTR is the responsibility of the BLM and is geared toward protecting lives and facilities at the widely scattered

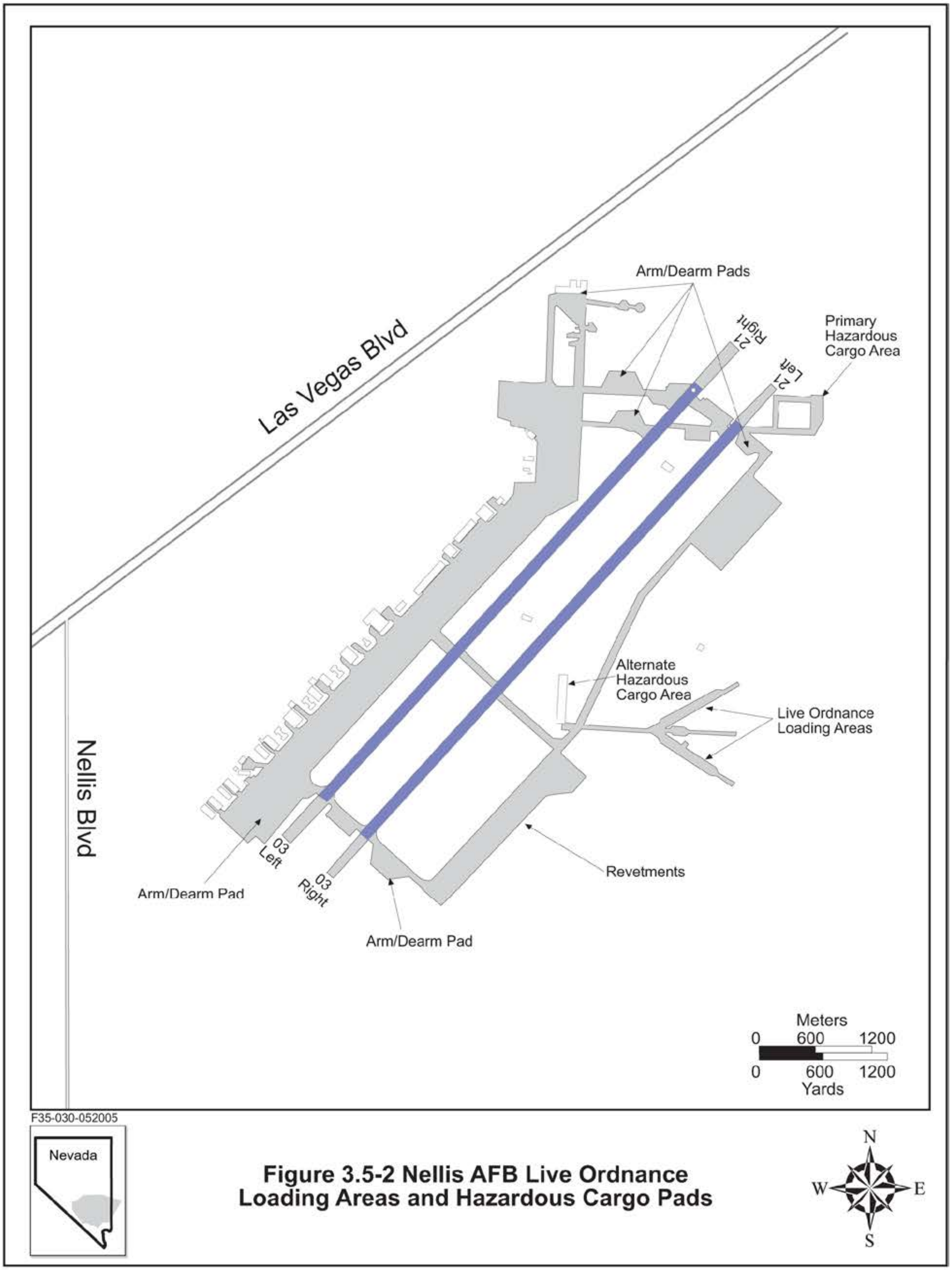


Figure 3.5-2 Nellis AFB Live Ordnance Loading Areas and Hazardous Cargo Pads

industrial complexes, not the suppression of wildfire. The Air Force is required to take necessary precautions to prevent and suppress brush and range fires occurring within and outside lands withdrawn by Public Law (PL) 106-65 as a result of military activities. As per the withdrawal, the Air Force is authorized to seek assistance from the BLM in the suppression of such fires. Nellis AFB has an existing Support Agreement with the BLM, Las Vegas Field Office for firefighting support (personal communication, Christensen 2005). Fire and crash response on the South Range is provided by the Air Force fire department at Creech AFB; if needed, additional assistance can be provided, under an existing mutual support agreement for fire suppression with the Air Force by Clark County (personal communication, Williams 2005).

Fires do occasionally occur on NTTR lands. While an average of four to five small (less than 3 acres) fires occur each year, they result from a variety of sources, including lightning and flares. Under NTTR MOAs, fires tend to be larger (less than 100 acres), but have been found to be caused mostly by cigarettes, matches, vehicle sparks, or fireworks (Air Force 1997a).

Compared to the 250,000 flares dispersed over NTTR annually (personal communication, 98 OSS/OSO 2005), fires attributable to flares are rare for several reasons. Foremost, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. As such, the probability of a flare igniting vegetation would be expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft Mishaps

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory (combat losses are excluded from these mishap statistics). In the case of MOAs and restricted areas, an estimated average sortie-operation duration is used to estimate annual flight hours in the airspace. Therefore, the Class A mishap rate per 100,000 flying hours can be used to compute a statistical projection of anticipated time between Class A mishaps in each applicable airspace unit. It should be emphasized that those data considered are only statistically predictive; the actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Several factors can influence the calculation of this projected time interval between Class A mishaps. Since the calculation is based on hours of flight time per year, an indication of increased risk can result from a large number of aircraft flying in the airspace, or a smaller number flying for extended periods of time. To place these values into context, it is also appropriate to consider the probability of a mishap, which accounts for each aircraft's exposure. Aircraft mishap data were analyzed in both the 1999 Nellis

Range Renewal Legislative EIS (Air Force 1999b) and the F-22 FDE and WS Beddown EIS (Air Force 1999a). These analyses demonstrated that the probability of Class A mishap within NTTR airspace was very low. The probability of a Class A mishap occurring within the NTTR airspace units (i.e., MOA and restricted airspace) ranged from a low of 0.000003 to a high of 0.000030. Flight conditions and sortie-operations have remained the same to 2007, so the levels of risk of mishaps continue to remain low. Overall, there is low risk associated with flight operations within NTTR. In fact, over the last 5 years, there have been eight Class A mishaps within NTTR (personal communication, 57 WG/SEF 2006) while the total number of sortie-operations has been well over 1 million.

Bird/Wildlife-Aircraft Strike Hazard

The Air Force BASH Team maintains a database that documents all reported bird-aircraft strikes. Historic average annual information for the last 10 years for NTTR airspace indicates that ten bird-aircraft strikes have been reported. Of these, one resulted in a Class B mishap and three in Class C mishaps; none of these resulted in a Class A mishap. Given that the sortie-operations within NTTR account for millions of miles flown at all altitudes, the occurrence, and probability of bird-aircraft strikes are negligible.

Ordnance Use

Release of ordnance is limited to ranges within NTTR. Air Force safety standards require safeguards on weapons systems and ordnance to ensure against inadvertent releases. All munitions mounted on an aircraft (as well as the guns carried in the aircraft) are equipped with mechanisms that preclude release or firing without activation of an electronic arming circuit (Air Force 2001a).

System malfunctions or materiel failures, possibly resulting in either an inadvertent release of ordnance or the release of a dud component that fails to operate properly, cannot be totally discounted. However, studies have shown that the probability of such an inadvertent release of ordnance occurring and resulting in injury to a person or damage to property is minimal (Air Force 2005c).

Air-to-ground ranges in NTTR support delivery of a wide range of ordnance. Approximately 80 percent of the ranges accommodate training or inert bombs and rockets, approximately 64 percent accommodate live bombs, rockets, and missiles, and approximately 61 percent accommodate strafing.

Based on historical data, “footprints” have been developed that describe a geographic area within which a training munition may ultimately be expected to come to rest on the ground. These zones have a long (i.e., beyond the target), short (i.e., in front of the target), and cross-range dimension. Based on data developed from varied attack profiles, flown by varied aircraft, and the type of ordnance delivered, frequency distributions for the dispersion of these munitions have been developed and, with a 95 percent confidence level, a geographic area within which 99.99 percent of the delivered munitions will be

contained has been described (Air Force 1998a, 2010). This geographic area is then considered the weapon footprint, and is unique for each weapon system, aircraft, ordnance type, and delivery profile. The weapon footprints are then used to define the area where people are prohibited from entry when the range and/or targets are in use. Application of these footprints is a prime safety concern, and is one of the elements contributing to the target/ordnance compatibility documentation contained in Nellis AFB Addendum A to AFI 13-212, Volume 1 (Air Force 2010).

Flares consist of magnesium and teflon pellets that burn rapidly and completely after being dispensed. A flare begins burning immediately after it is expelled; reaching its highest temperature (1,000 degrees Fahrenheit) by the time it passes the tail of the aircraft. The actual amount of time it takes for a flare to burn out completely is classified. The minimum release altitude is that altitude which allows the flare to burn out before reaching 100 feet above the ground. Minimum flare release altitude over manned sites, ground parties, or within 3 nm of forested areas is 5,000 feet AGL. The use of self-protection flares in a MOA is limited to 5,000 feet AGL and above, providing an additional margin of safety to prevent burning flare material from contacting the ground. When the fire code is “extreme” flares are not permitted below 5,000 feet AGL in any airspace. The 98 OG/CC determines if additional restrictions or modifications are needed based on prevailing climatic conditions (Air Force 2010).

Toxicity of flare materials is minimal because magnesium, the primary material found in flares, is considered not likely to be ingested by humans or animals. Impulse cartridges and initiators used with some flares contain chromium and, in some cases, lead; hazardous air pollutants under the Clean Air Act. However, a screening health risk assessment concluded that they do not present a health risk in the quantities involved. Laboratory analyses of flare pellets and flare ash indicate that these materials have little potential for affecting soil or water resources (Air Force 1997a). Field studies also indicate that flare debris does not accumulate in noticeable quantities; therefore, there is little potential to impact resources (Air Force 1997a).

Wind Generators

The development and use of renewable energy, such as wind generating energy facilities, have become important, and several wind generators can be found in the region around NTTR. The airspace manager at Nellis AFB has evaluated the location of these generators and determined that they do not pose a threat to aircrew safety. Range personnel ensure aircrews are also aware of the objects and the potential impacts with regard to safety, electromagnetic interference and radar signature, and operational security. The Air Force is formulating a policy to ensure future placement of energy development facilities are coordinated with appropriate federal and state agencies, and communities in an effort of avoid conflicts with NTTR mission operations and safety.

3.6 LAND USE AND RECREATION

Land use generally refers to human modification of the land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. Human land uses include residential, commercial, industrial, agricultural, or recreational uses; natural features are protected under designations such as national parks, national forests, wilderness areas, or other designated areas. The attributes of land use include general land use and ownership, land management plans, and special land use management areas. Land ownership is a categorization of land according to the type of owner; the major land ownership categories include federal, state, and private. Underlying NTTR airspace, federal lands are further designated as U.S. Forest Service (USFS), BLM, USFWS, DOE, and DoD managed. Land uses are frequently regulated by management plans, policies, and ordinances that determine the types of uses that are allowable or protect specially-designated or environmentally-sensitive attributes. Special land use management areas are identified by agencies as being worthy of more rigorous management.

3.6.1 Land Use

Affected areas for land use consist of Nellis AFB, including the area adjacent to the base subject to aircraft noise, and NTTR, which includes the ranges and all other lands under NTTR airspace.

Nellis AFB

On-Base Land Use

Land uses on Nellis AFB are detailed in the *Nellis Air Force Base General Plan* (Air Force 2002a); the following summarizes those uses. Nellis AFB is located in southern Nevada and is about 8 miles northeast of Las Vegas in Clark County. It is composed of 14,161 acres (refer to Figure 2-1) and is divided into three areas: Area I, the Main Base; Area II, the MSA/Wilderness Study Area, REDHORSE Squadron, REDHORSE Reserve Squadron, and Munitions Squadron; and Area III, including Manch Manor housing, the hospital, temporary lodging facilities, Family Camp, and an industrial area. There are more than 2,000 buildings in the Nellis AFB inventory.

Area I is located east of Las Vegas Boulevard and contains 30 percent of the total base land area. Area I contains the greatest variety of land use activities, including runways, industrial facilities, housing areas, and most of the base's administrative, training, and support facilities.

Area II is located northeast of the Main Base and includes the munitions/weapons storage area and associated facilities; this area is 59 percent of the total base land area. The majority of Area II is set aside as safety zones, open space, and industrial; there is also a minor allocation of land and facilities to administrative, commercial, dormitories, and outdoor recreation.

West of Las Vegas Boulevard is Area III, containing 11 percent of the total base land area. Land use at Area III consists of housing, recreational facilities, and some light industrial areas, interspersed with considerable open space.

Open space accounts for about 66 percent of all Nellis AFB land; however, a great deal of this is mandatory open space to provide safety zones around munitions storage or similar facilities. Of the total open space, 75 percent is located in Area II; most of this land is unavailable for future development because it is mandatory open space for explosive safety zones and clear zones. When munitions storage and directly associated facilities and safety zones are combined, munitions operations account for approximately half of the total Nellis AFB land area.

Another land use criteria on and around Nellis AFB is designed to minimize the effects of a potential aircraft accident. Clear, safety, and accident potential zones (refer to Figure 3.5-1) have been established around the airfield. The safety zones occur both on-base and extend to off-base lands not owned by DoD. Within clear and safety zones, construction is either prohibited (CZ) or limited in terms of placement and height (APZ or safety zone). In APZ I, DoD recommends that land uses be limited to light industrial, manufacturing, transportation, communications utilities, wholesale trade, open space, and agricultural uses. Uses that concentrate people in small areas are not considered acceptable. It is recommended that land uses within APZ II include all of those considered compatible with APZ I, as well as low density residential, service, and retail trade. Uses that concentrate high densities of people in small areas are not considered appropriate in APZ II. On-base land uses are compatible with the CZs and APZs (Air Force 2004c).

Noise levels of 65 dB DNL to greater than 85 dB DNL affect the base, with the highest noise levels on and around the runway and flightline. Land affected by noise levels of 85 dB DNL or greater lie within the boundaries of Nellis AFB (refer to Figure 3.3-1). All of Area I underlies noise contours of 65 dB DNL or greater whereas large portions of Areas II and III lie outside the 65 dB DNL contours. The Nellis Terrace Housing Area, the elementary school, and airman dormitories in Area I are within 70 dB DNL and higher noise contours. Nellis AFB is in the process of incorporating engineered noise level reduction measures into the designs for future renovation and construction of Area I and II facilities within noise contours that exceed 65 dB DNL (Air Force 2004c).

Off-Base Land Use

Three communities lie adjacent to Nellis AFB: Sunrise Manor to the southeast, North Las Vegas to the west and north, and the City of Las Vegas, south of the base (Figure 3.6-1). Overall, most development occurs south and west toward the Las Vegas urban area and includes the unincorporated communities of Sunrise Manor and North Las Vegas. The City of North Las Vegas represents one of the fastest growing communities in the country. As such, land uses can change rapidly. To the north and northeast, most of

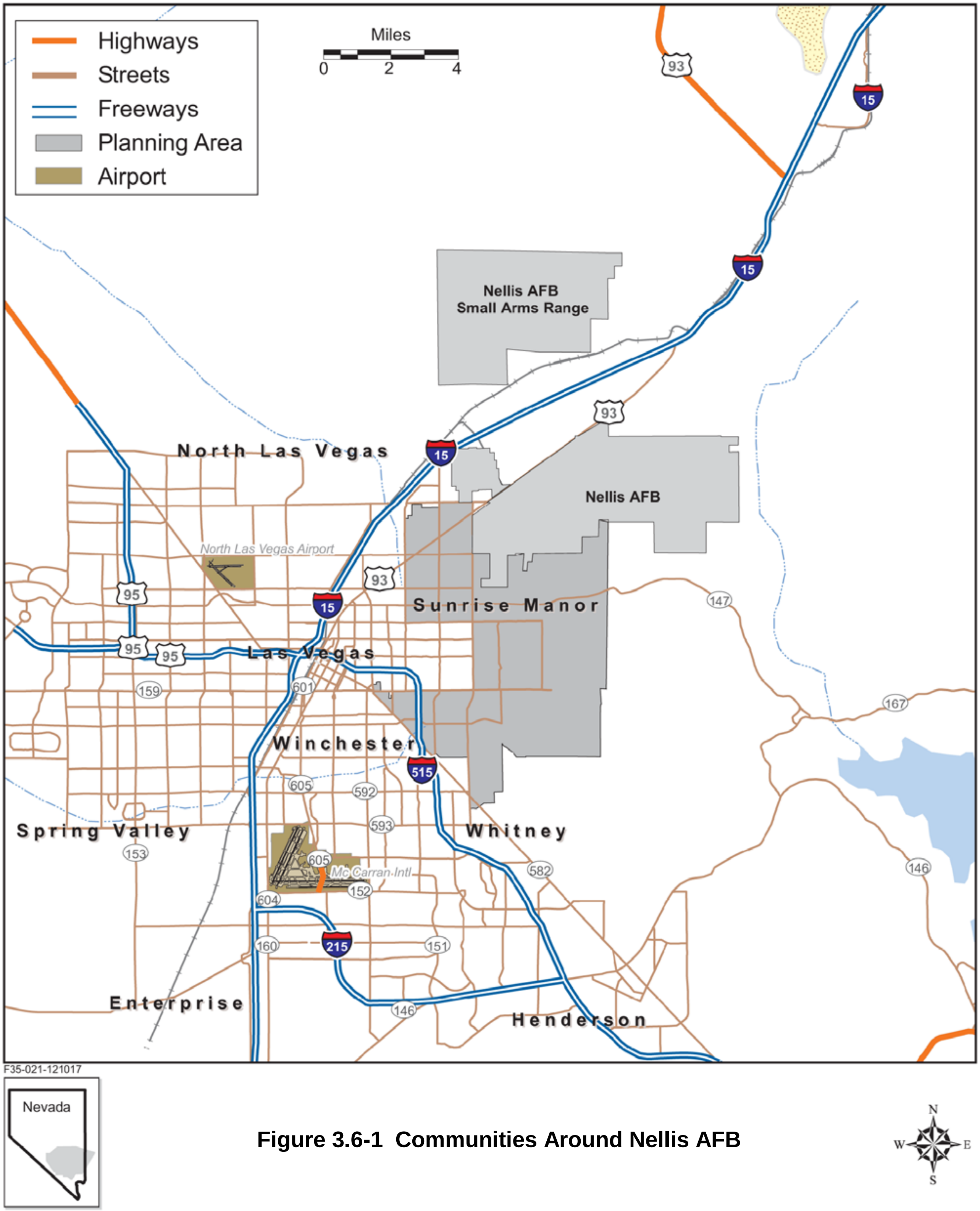


Figure 3.6-1 Communities Around Nellis AFB

the land is open range and mountain areas. Property to the east of Nellis AFB is primarily undeveloped and mainly under the management of the BLM. Commercial/industrial uses (e.g., fuel storage, race track) exist along Las Vegas Boulevard. To the south and west, land use is characterized by strip commercial parcels, mobile homes, single family homes, and industry.

Area land uses in the vicinity of Nellis AFB are analyzed and described in The City of North Las Vegas Land Use Master Plan Map (1999), the Airport Environs Element of the Clark County Comprehensive Plan (CCDCP 2010), and the Sunrise Manor Land Use Plan (CCDCP 2010). These plans consist of land use maps and policies that serve as a guide for making land use decisions. Regulations have been adopted by each community to implement their plans and policies, although Clark County has established ordinances associated with the Nellis AFB environs. The ordinances provide for a range of uses compatible with airport accident hazard and noise exposure areas and prohibit the development of incompatible uses detrimental to public health or safety. Clark County has incorporated these land use recommendations in the Clark County Unified Development Code, Title 30, Section 30.48, Part A, Airport Environs Overlay District, dated March 31, 2004, under the authority of Chapter 278, Planning and Zoning, of the Nevada Revised Statutes. Noise compatibility and airport environs implementing standards have also been adopted in the Clark County Public Health and Safety Programs: Airport Environs Plan, an amendment of the Clark County Comprehensive Plan (CCDCP 2010). Therefore, the Clark County airport environ contours (versus the contours presented in section 3.3) are used as the baseline condition for land use analysis.

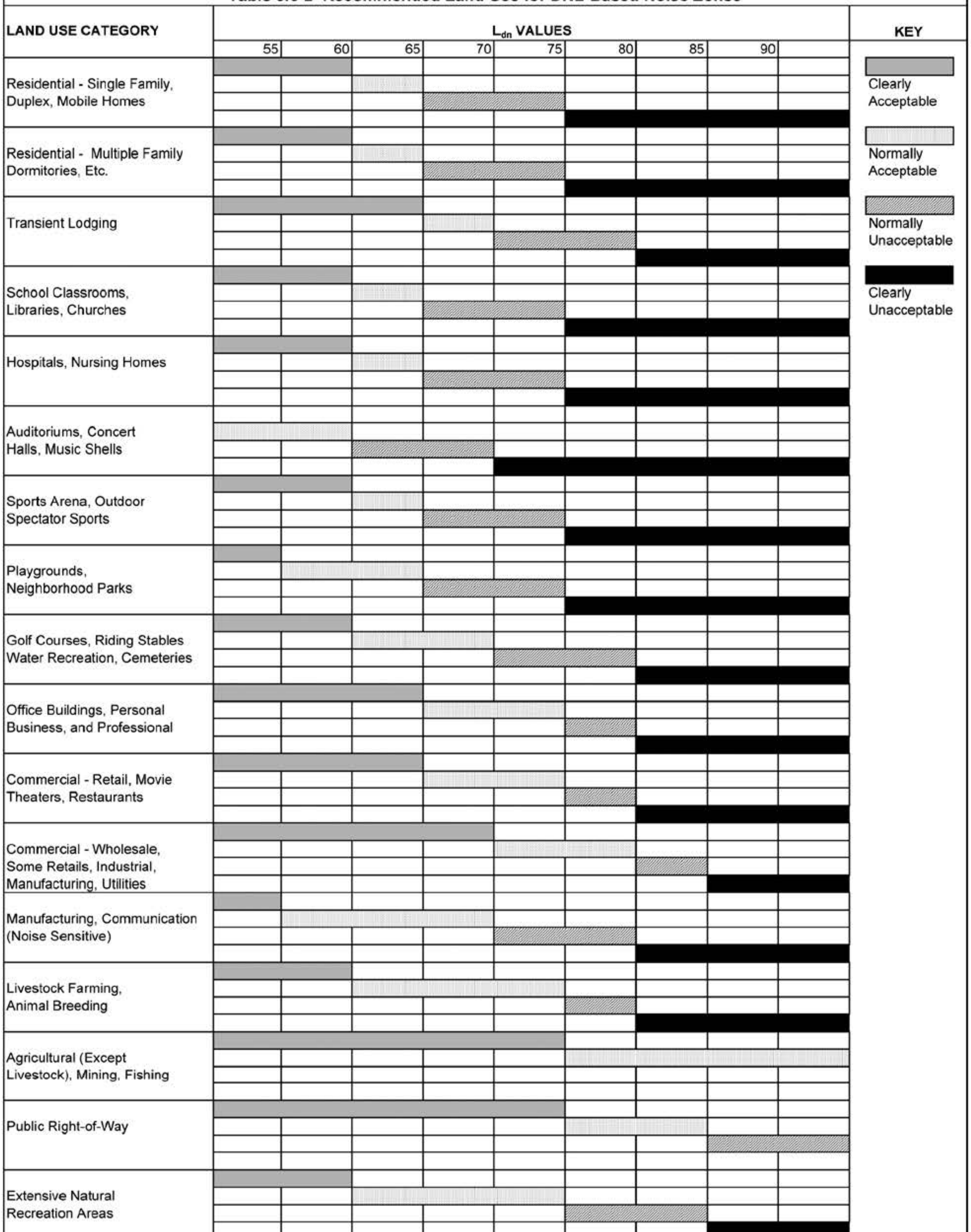
Clark County has established land compatibility use zones that are associated with the CZ, APZ I, APZ II, and noise contours 65 to 70 dB DNL, 70 to 75 dB DNL, 75 to 80 dB DNL, and greater than 80 dB DNL. Compatible land uses within these zones are described in Table 3.6-1 and they are consistent with the recommendations of the Air Force and the Standard Land Use Classification Manual (Table 3.6-2). In general, the regulations prohibit development within CZs and discourage anything other than low density development in APZ I and APZ II. Residential development is considered compatible within the 65 to 70 dB DNL noise contour band, with noise attenuation. However, in contour bands greater than 70 dB residential development is not considered compatible.

Table 3.6-1 Clark County Land Use Compatibility in the Airport Environs

Land Use	***Zones***			***Noise Contour Bands (dB DNL)***			
	Clear Zone	*APZ I*	*APZ II*	*65-70*	*70-75*	*75-80*	*>80*
Commercial	No	No	Yes[3]	Yes	Yes[5]	Yes[5]	No
Industrial	No	Yes[3]	Yes[3]	Yes	Yes	Yes[5]	Yes[5]
Open/Agricultural	No[1]	Yes[3]	Yes[3]	Yes	Yes	Yes[5]	Yes[1]
Recreational	No[2]	Yes[3]	Yes[3]	Yes	Yes	No	No
Residential	No	No	Yes[4]	Yes[5]	No	No	No

Notes: [1] Open land acceptable.
[2] Golf courses; driving ranges acceptable.
[3] Low density/intensity only.
[4] Less than two single family units per acre acceptable.
[5] With noise attenuation features.

Table 3.6-2 Recommended Land Use for DNL-Based Noise Zones



Source: U.S. Department of Housing and Urban Development 1991.

In keeping with recommendations and regulations, both CZs are completely within base boundaries. The APZs, however, contain a mixture of all land use types, including 18 acres of residential development (Table 3.6-3). The northern APZ II contains the Las Vegas Motor Speedway. There could be temporary population concentrations that could exceed the Air Force density recommendations of 50 persons per acre. However, races are held on weekends and evenings during hours of minimal flying operations and would not pose increased risks to populations gathering at the speedway. To the south, the majority of development adjacent to the base in APZ I is light industrial and commercial, which is compatible provided densities are not exceeded. However, the Carefree Country Manufactured Home Community (which is not accounted for in the county land use database) was identified within APZ through a screenshield survey. While they do lie within this APZ, the dwelling units do not exceed the two units per acre stipulation in the Clark County Comprehensive Plan. APZ II contains a mix of industrial, commercial, and residential development. Mobile home parks and apartment complexes (to the south) constitute most of the residential activity and are considered incompatible according to Air Force development density guidelines (Air Force 2004c). The Air Force continues to work with the community to minimize impacts and risk through their active AICUZ program.

Table 3.6-3 Land Use Within CZs and APZs

Land Use Category	***Existing Land Use (Acres)***		
	Clear Zone	*APZ I*	*APZ II*
Commercial	0	0	19
Industrial	0	373	1,440
On Base	555	601	419
Open	0	0	69
Public	0	21	17
Recreational	0	0	0
Residential	0	0	18
Total	**555**	**995**	**1,982**

Clark County Airport Noise Environ contours show approximately 25,831 acres affected by sound levels greater than 65 dB DNL (Table 3.6-4). Existing industrial and recreational land uses are compatible with these noise contours. However, some incompatibility is found with existing land use south of Nellis AFB. Again, coordination with the community through the Nellis AFB AICUZ program is continually undertaken to minimize safety and noise exposure risks.

Table 3.6-4 Land Ownership Under Clark County Airport Noise Environ Contours (in acres)

Land Ownership	***Noise Contour Bands (dB DNL)***						
	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Subtotal Acres*	*Subtotal %*
BLM	9,535	3,958	563	0	0	15,625	60
Private	6,119	3,180	1,896	548	32	10,206	40
Total	**15,654**	**7,138**	**2,459**	**548**	**32**	**25,831**	**100**

General land ownership encompassed by Clark County Airport Environ baseline noise levels, outside Nellis AFB boundaries, exceeding 65 dB DNL is presented in Table 3.6-4. Within this area, 40 percent of the land is privately owned, primarily to the southwest of Nellis AFB. Sixty percent, mostly to the

northeast, is federal undeveloped land managed by the BLM. In areas with noise levels exceeding 65 dB DNL, most of the land is open or industrial.

In Table 3.6-5, land uses are identified, the number of acres for each land use is presented, and percent of total acres within noise contour bands 65 dB DNL and greater are indicated. Figures 3.6-2 and 3.6-3 illustrate these land uses with overlying baseline noise contour bands. Approximately 10 percent of residential acres fall within noise contour bands greater than 65 dB DNL, with 51 percent found in commercial and industrial land uses. Public lands comprise 10 percent of the acres within noise contour bands 65 dB DNL and greater, mixed use 2 percent, and open areas 2 percent. Military land use comprises 25 percent of the total acres within the 65 dB DNL and greater contour bands.

Table 3.6-5 Land Use Within Clark County Airport Environ (in acres)

Land Use Category	***Noise Contour Bands (dB DNL)***						
	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Subtotal Acres*	*Subtotal %*
Commercial	1,584	1,442	515	6	0	*3,547*	10%
Industrial	7,372	4,568	1,631	520	31	*14,122*	41%
Mixed Use	813	23	0	0	0	*836*	2%
Open	538	14	28	0	0	*580*	2%
Public	2,272	841	238	21	0	*3,372*	10%
Recreational	0	0	0	0	0	*0*	0%
Residential	3,037	213	42	0	0	*3,292*	10%
Military	2,137	2,180	1,324	1,187	1,588	*8,416*	25%
Total	**17,755**	**9,281**	**3,778**	**1,734**	**1,619**	**34,167**	**100%**

Under baseline conditions, no residential areas are found within the 80 to 85 dB DNL and greater contour bands. Within the 75 to 80 dB DNL contour bands, there are 3,778 acres affected, the majority (3,470) are found in commercial, industrial, and military land uses, with just 42 acres found in residential areas.

To reduce noise over residential area, Nellis AFB currently undertakes noise abatement procedures for flights over Sunrise Manor and North Las Vegas that generally include the following:

- expedited climb to 6,000 feet MSL for fighter aircraft and 2,500 to 3,500 feet MSL for others;
- 60-degree banked right turn upon departure;
- a departure to the north before 9 a.m.;
- limiting arrivals and departures between 10 p.m. and 6 a.m. to mission essential aircraft; and
- practice takeoffs and landings scheduled between 6 a.m. and 10 p.m.

To the maximum extent possible, engine runup locations have been established in areas that minimize noise for people on base, as well as for those in the surrounding communities. Normal base operations do not include late-night engine runups, but heavy workloads or unforeseen contingencies sometimes require a limited number of night-time engine run-ups.

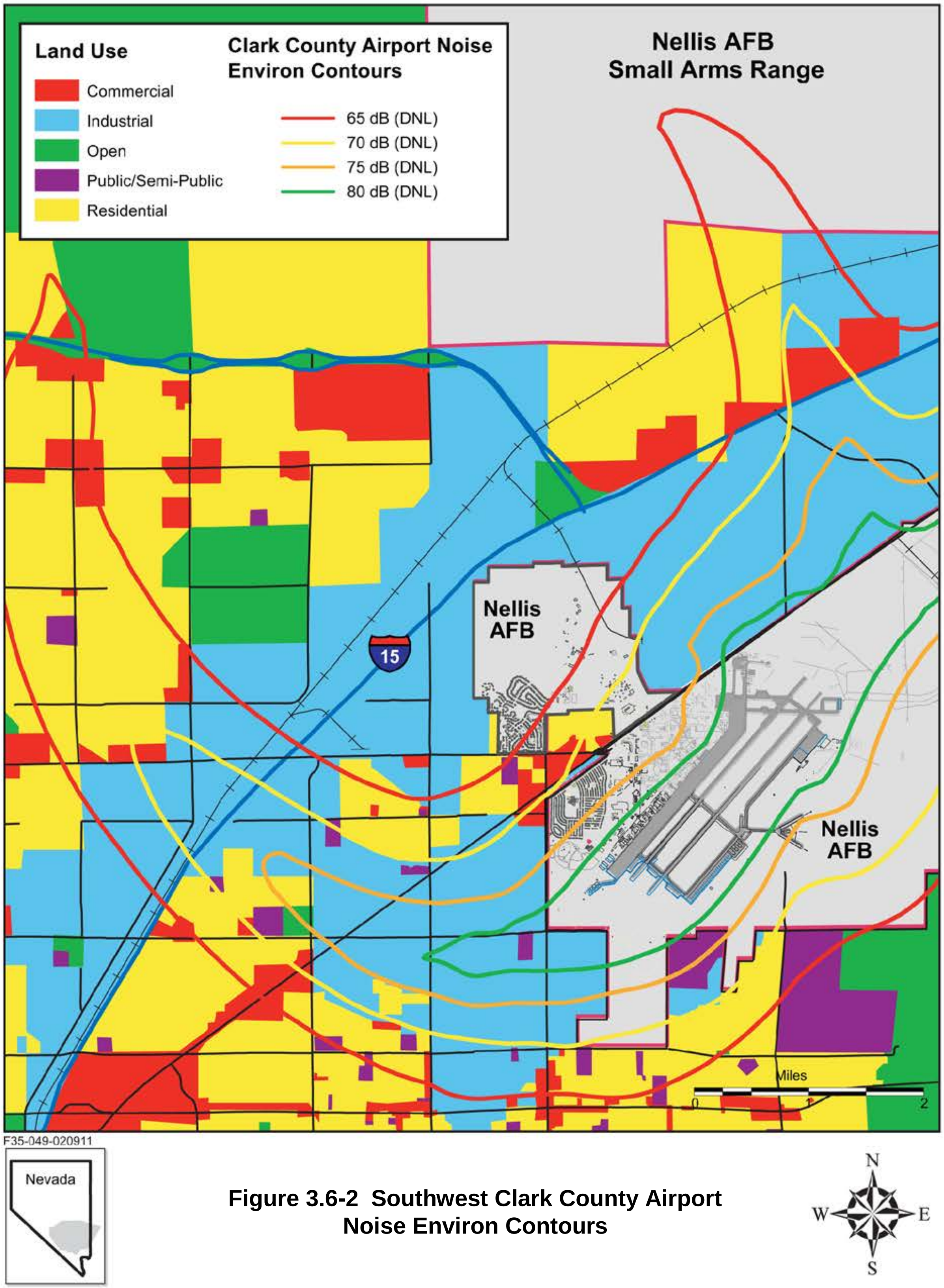


Figure 3.6-2 Southwest Clark County Airport Noise Environ Contours

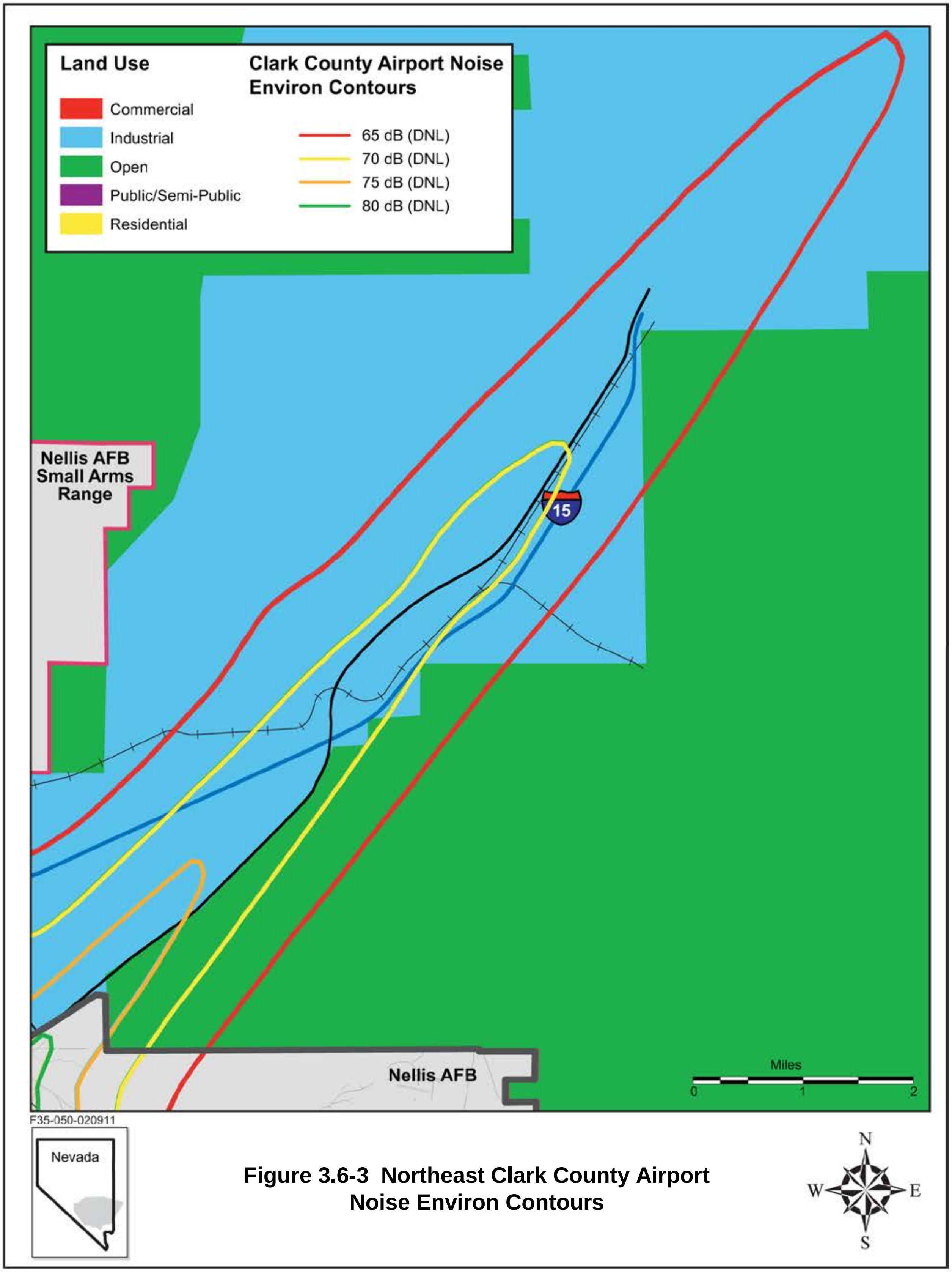


Figure 3.6-3 Northeast Clark County Airport Noise Environ Contours

Nevada Test and Training Range

The NTTR consists primarily of the withdrawn lands and federal land managed by BLM for multiple use with additional areas managed by DOE, USFS, USFWS, the State of Nevada, and private individuals. Land uses on NTTR are discussed in the *Land Use Study for Nellis Air Force Range* (Air Force 1998a) and in the *Renewal of the Nellis Air Force Range Land Withdrawal Legislative Final EIS* (Air Force 1999b). Withdrawn lands within NTTR are managed by the Air Force, BLM, and USFWS. These lands were once used primarily for mining and some grazing, until establishment of the range in the 1940s. Since then, the land has been used for military purposes, although some mining and controlled recreational activities are permitted and continue to occur within the confines of the range. The land also provides habitat for wild horses, bighorn sheep, desert tortoises, and other wildlife species.

In accordance with the Federal Land Policy and Management Act (FLPMA) of 1976, NEPA, and Military Lands Withdrawal Act (MLWA) of 1999, the Department of Interior (DOI), through the BLM Las Vegas Field Office developed the *Nevada Test and Training Range Resource Management Plan and Final EIS* (BLM 2003) to guide management of BLM land comprising NTTR currently under Air Force stewardship. BLM's guiding principle of multiple use extends to the use of federal lands withdrawn for national defense and security, which, although not available for public use, remain under BLM's management. The NTTR plan guides management of the resources of approximately 2.2 million acres of public lands for the next 20 years (BLM 2003).

The Wild Horse and Burro Act of 1971 (16 U.S.C. 1331-1340), and regulations of the Secretary of the Interior (43 CFR Part 4700) place the responsibility for protection, management, and control of wild free roaming horses and burros with BLM when such animals use federal lands administered by BLM as all or part of their habitat. Wild Horse Herd Management Areas (HMAs) are special use land management areas established to maintain populations of wild horses. HMAs delimit areas within which specified numbers of wild horses are protected from overpopulation and harassment. Management tools include periodic monitoring of population numbers, water sources, distribution patterns, and the condition of adults and foals. In accordance with federal regulations, BLM (as the agency responsible for protection, management, and control of wild horses and burros using federal lands) with Air Force concurrence, established an HMA within the confines of NTTR to facilitate management of the wild horses that use land within the range (Figure 3.6-4). The HMA does not manage for wild burros, and few, if any, are found on NTTR. As part of the NTTR BLM Plan, it was decided that the appropriate management level of wild horses in the HMA would be adjusted to range from 300 to 500 in order to allow for a more equitable distribution of critical range resources between wildlife. Noise levels in the Wild Horse HMA range between 51 and 60 dB L_{dnmr} at 200,000 sortie-operations and 53 and 62 dB L_{dnmr} at 300,000 operations. The lowest noise levels over the Wild Horse HMA are under R-4809: 51 dB L_{dnmr} at 200,000 sortie-operations and 53 dB L_{dnmr} at 300,000.

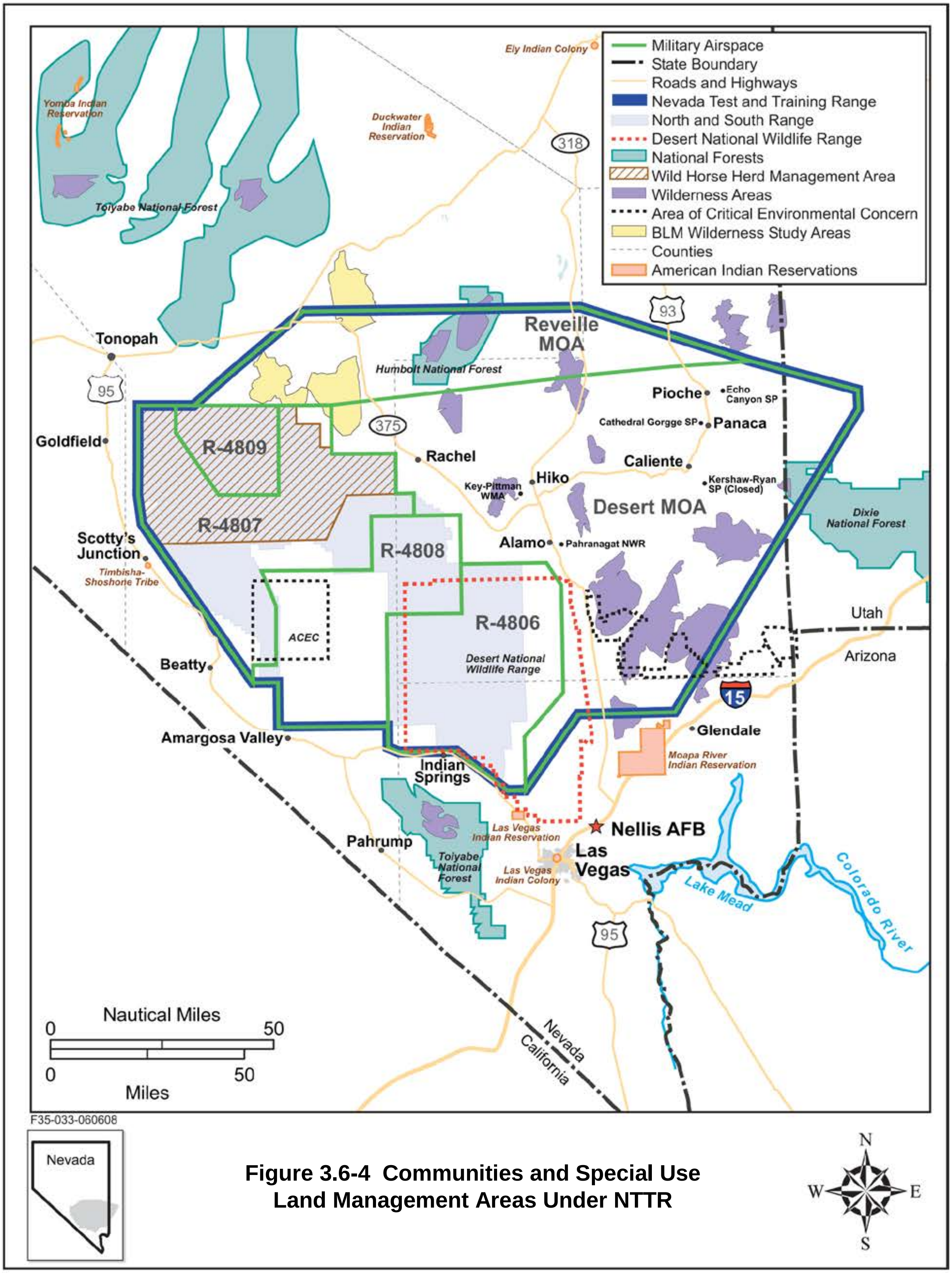


Figure 3.6-4 Communities and Special Use Land Management Areas Under NTTR

DNWR, also a special use land management area within NTTR, was originally established by Public Land Order 7373 in 1936 and became part of the National Wildlife Refuge System in 1976. As amended in 1966, it currently consists of approximately 1.6 million acres, with 826,000 acres withdrawn for military use. The DNWR is located within and adjacent to the southeastern area of NTTR. Its southernmost boundary is about 0.5 mile from the city limits of Las Vegas. The DNWR falls under R-4808 and R-4806. Baseline noise levels for R-4808 are 45 dB L_{dnmr} based on 200,000 and 47 dB L_{dnmr} based on 300,000 sortie-operations. Noise levels for R-4806 are currently 55 dB L_{dnmr} based on 200,000 sortie-operations and 56 dB DNL at 300,000 sortie-operations. A Comprehensive Conservation Plan/Environmental Impact Statement for the DNWR is currently being developed for land management purposes; however, the draft document has not been published for public review.

All grazing rights or privileges within the joint-use area of DNWR have been eliminated through purchase or termination of permits. Use and public access to the joint-use area of DNWR and NTTR are restricted by a memorandum of understanding (MOU) between the Air Force and DOI and the MLWA of 1999. A description of wildlife resources and management within DNWR is provided in section 3.9, Biological Resources.

Most of the area under NTTR MOA airspace consists of federal lands managed by BLM. The BLM manages lands in units referred to as field offices and subunits of field stations. The NTTR MOAs encompass airspace over lands within the Las Vegas, Battle Mountain, and Ely Field Offices and the Tonopah and Caliente Field Stations in Nevada. A small portion of the MOAs overly the BLM Utah's Cedar City and St. George Field Offices and the Dixie National Forest. FLPMA requires each field office or station to develop and manage lands by use of a Resource Management Plan.

The Ely Field Office prepared the *Ely Resource Management Plan and Record of Decision* (BLM 2008); this plan includes management of all lands within the Ely District boundaries. The Battle Mountain Field Office manages lands within their district through the *Tonopah Resource Area Management Plan and Record of Decision* (BLM 1997); however, the BLM has just announced in its Notice of Intent that is preparing a new Resource Management Plan through its Battle Mountain Field Office (BLM 2010).

The goal of these plans is to provide a comprehensive framework for managing public lands over the course of 15 to 20 years. Specific management objectives are provided for watershed, vegetation, visual resources, wildlife habitat, special-status species, riparian habitat, forestry and vegetative products, livestock grazing, wild horses and burros, forage allocation, cultural resources, lands and rights-of-way, Areas of Critical Environmental Concern (ACECs), recreation, wilderness, utility corridors, minerals, and fire management.

Among the special use land management areas of the BLM, ACECs are managed to preserve the uniqueness of the specific area. The characteristics of an ACEC may be unique geologic features, natural

habitat, or cultural resources. The Timber Mountain Caldera ACEC is located under NTTR airspace and within DOE's NTS and was designated because of its unique geologic features. Kane Springs, Mormon Mesa, and Beaver Dam Slope ACECs are located under the Desert MOA and represent quality desert tortoise habitat. If and/or when new ACECs are added under NTTR airspace, the Air Force and BLM will continue working together to ensure minimal land management conflicts with the Air Force's military mission.

Inclusion of land into the National Wilderness Preservation System is intended to preserve areas in a primitive state that possess little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating areas for wilderness characteristics and gave direction on how designated wilderness areas should be managed. Subject to certain exemptions, use of motor vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas. Each federal agency is responsible for evaluating, nominating, managing, and protecting designated and potential wilderness areas within the lands they manage.

The BLM, in accordance with Section 603(c) of FLPMA, reports to Congress on the federal lands under its management suitable for inclusion in the National Wilderness Preservation System. To accomplish this task, BLM inventoried and evaluated federal lands under its jurisdiction to determine areas suitable for wilderness designation. The result of the land inventory was the identification of a number of Wilderness Study Areas. The major factors evaluated for each Wilderness Study Area include wilderness qualities such as naturalness, size, solitude, and special features; additional wilderness quality factors include multiple resource benefits, balancing the geographic distribution of wilderness areas, diversity of natural systems, and manageability (BLM 1997). BLM submitted recommendations for designation of these lands to the Secretary of the Interior for congressional action. In 2002, Congress passed the *Clark County Conservation of Public Land and Natural Resources Act of 2002* which designated 451,915 acres of wilderness of which the 27,530-acre Arrow Canyon Wilderness is under the NTTR airspace. In 2004, Congress passed the *Lincoln County Conservation, Recreation, and Development Act of 2004* which designated approximately 769,611 acres of wilderness and released 245,516 acres from Wilderness Study Area consideration.

The area under NTTR airspace contains 14 wilderness areas and 3 Wilderness Study Areas (Table 3.6-6) with current noise levels between 51 and 59 L_{dnmr}.

Table 3.6-6 Wilderness Areas and Wilderness Study Areas Underlying NTTR MOA Airspace

Wilderness Area	***Acres***
Worthington Mountains	30,936
Weepah Springs	51,117
South Pahroc Range	25,638
Clover Mountains	85,757
Meadow Valley Range	124,833

Table 3.6-6 Wilderness Areas and Wilderness Study Areas Underlying NTTR MOA Airspace	
Wilderness Area	***Acres***
Mormon Mountains	153,939
Tunnel Spring	5,530
Delamar Mountains	111,389
Arrow Canyon Range	27,530
Parsnip Peak	45,837
Big Rocks	13,913
Mt. Irish	31,088
Quinn Canyon Forest Service Wilderness	27,000
Grant Range Forest Service Wilderness	50,000
Wilderness Study Area	***Acres***
Kawich	54,320
South Reveille	33,000
Palisade Mesa	23,233

In 1975, the USFWS proposed approximately 88 percent of the DNWR for inclusion in the National Wilderness Preservation System. Areas excluded from the wilderness proposal included land on which NTTR target facilities are located; these are generally located in valleys below 4,000 feet (below 3,600 feet in Three Lakes Valley). The proposed wilderness area within DNWR is currently managed as wilderness so as not to impair its wilderness qualities. The USFS manages the Quinn Canyon and Grant Range wilderness areas in the Humboldt National Forest (refer to Figure 3.6-4)

Other federal lands underlying NTTR include the NTS, managed by DOE's National Nuclear Security Administration; portions of the DNWR; Pahranagat National Wildlife Refuge (NWR); as well as portions of the Humboldt and Dixie National Forests. Land use in the national forests consists of grazing, recreation, wildlife and wildlife habitat preservation, timber production, and mining. The State of Nevada maintains two state parks and one state recreation area on lands under NTTR airspace. Noise levels in these areas range from 45 to 59 dB L_{dnmr}, but most areas experience noise levels around 53 to 56 dB L_{dnmr}.

3.6.2 Recreation

Recreation resources include primarily outdoor recreational activities that occur away from a participant's residence. This section addresses natural resources and man-made facilities that are designated or available for public recreational use in both urban and rural areas. The setting, activity, and other resources that influence affected recreation resources are also considered.

The affected environment for recreation consists of lands on and adjacent to Nellis AFB and the lands under NTTR airspace. The analysis examined the effects of noise on recreation use at recreation areas surrounding Nellis AFB and on lands underlying NTTR. Potential recreation opportunities and sites were determined through informal consultation with the BLM and other land management agencies.

Nellis AFB

Recreational opportunities and facilities are an integral part of planning and development at all Air Force bases. At Nellis AFB, recreation facilities available to military personnel and their families include a variety of indoor and outdoor facilities (Figure 3.6-5). Indoor recreational facilities include a sport and fitness center, movie theater, bowling center, Child Development Centers I and II, a library, automotive skills center, and a youth center. The base also provides full service equipment rentals for on- and off-base recreation use. Outdoor recreation facilities, which occupy about 577 acres (4 percent of the total Nellis AFB land area), include an Olympic-sized swimming pool, Sunrise Vista Golf Course, tennis courts and athletic fields, lighted track at the "Runner's World" park, and Freedom Park, a large picnic and athletic facility. The Family Camp, a facility with recreational vehicle parking spaces and full service hookups, and equestrian facility are in Area III. Recreational opportunities are available in all three areas of the base, although most facilities, including the golf course and swimming pool, are in Area I.

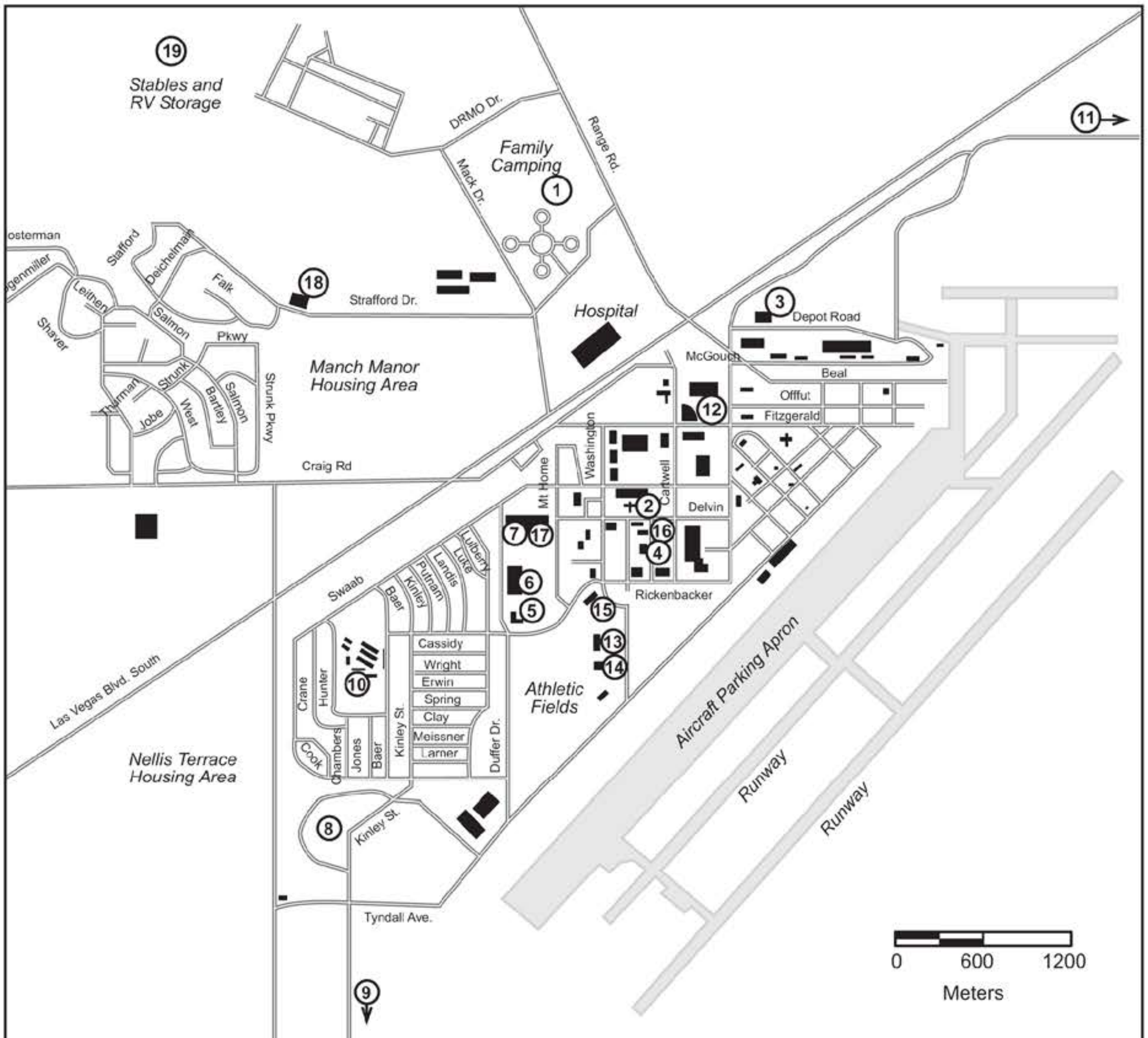
Recreation facilities in the vicinity of the base are at neighborhood parks and schools. These facilities provide picnic areas and playing fields. A speedway is located along Las Vegas Boulevard in the vicinity of the base. Recreation programs such as climbing, horseback riding, and family fun centers are offered through both the cities of Las Vegas and North Las Vegas. Las Vegas Dunes Recreation Land is north of the base and provides all-terrain-vehicle riding and other motor sports.

Nevada Test and Training Range

Most of the land beneath NTTR MOA airspace, that is open to public recreation, is managed by the BLM for multiple use, which includes recreation. Access by the public to the NTTR withdrawn lands is prohibited with the exception of limited hunting which is allowed under permit conditions and existing MOUs. All target and weapons safety footprint areas are controlled by range and recreational personnel per AFI 13-212. Hunting on NTTR is coordinated with the Nevada Department of Wildlife (NDOW) and USFWS.

Numerous broad valleys separate the north-south trending mountain ranges within and surrounding NTTR. The diverse landscape provides a variety of outdoor recreation opportunities ranging from hiking, camping, and nature viewing to off-road vehicle use, mining, and hunting. State parks, recreation areas, national forests, and wildlife refuges are also destinations for visitors.

Hunting occurs within portions of the DNWR (managed by the USFWS) and NDOW manages game animals within the state. Hunting for bighorn sheep is authorized in the DNWR for a few weeks in December and in the Stonewall Range for a few weeks in November; no other hunting or recreational



1. Family Camping Area
2. Skills Development Center
3. Auto Crafts
4. Bowling Center
5. Child Development Center
6. Child Development Center II
7. Community Center
8. Freedom Park: Directional Overview
9. Golf Course Clubhouse
10. Lomie Heard Elementary School :(Nellis Terrace Housing Area)
11. Rod and Gun Country Club
12. Sports Pavilion
13. Olympic Pool
14. Outdoor Adventure
15. Sports and Fitness Center
16. Theater
17. Tickets & Tours
18. Youth Center
19. Stables and Recreational Vehicle Area

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Figure 3.6-5 Recreation Areas on Nellis AFB

activities are allowed on the withdrawn portions of NTTR. Under the MOAs, bighorn sheep, elk, mule deer, antelope, and upland game (grouse, chukar, quail pheasant, dove, rabbits, etc.) are hunted throughout the area.

Due to the dispersed nature of primitive recreation, accurate recreation usage is difficult to measure. Many activities such as camping and hiking do not require special permits, so visitors often are not precisely counted. The BLM Ely Field Office and the Caliente Field Station Office manage the majority of land under the associated airspace and have identified areas where recreation use is a concern due to unique or special attributes such as botanical, zoological, geological, and paleontological values. These areas are Ash Springs, Clover Creek, Gleason Canyon, Ella Mountain Summit, Panaca Charcoal Kilns-Panaca Summit, Oak Springs Summit, and Hancock Summit (Figure 3.6-6). The Tonopah Resource Area is under the northwest portion of the associated airspace. Recreation for the entire Tonopah area accomodated approximately 175,000 visitors in 2005 (personal communication, Fisher 2006).

Wilderness Areas and Wilderness Study Areas are located throughout these lands and provide primitive recreation opportunities. Small portions of two national forests, Dixie and Humboldt, are located under NTTR airspace. Both offer picnicking, camping, and hiking in rugged mountainous terrain. Cathedral Gorge State Park, Beaver Dam State Park, and Echo Canyon State Recreation Area are located under the northeast portion of NTTR airspace. Each of these areas offers camping, picnicking, and hiking in a scenic location. Beaver Dam State Park and Echo Canyon State Recreation Area also offer fishing and water skiing. Current noise levels in these areas range from 54 to 59 dB L_{dnmr}.

Other areas also attract visitors because of their distinctive attributes: the Key Pittman Wildlife Management Area (WMA), Pahranagat NWR, White River Petroglyphs Archaeological Site, and Leviathan Cave Geologic Area. Ghost towns under NTTR MOAs exhibit various states of disrepair, but also attract visitors. Usually these sites contain a few buildings or foundations of buildings. Some also have cemeteries, mine tailings, and other evidence of historic mining. Historic ghost towns and mining camps are further discussed in section 3.10, Cultural Resources.

NWRs are designated and managed by USFWS to "preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the U.S. for the benefit of present and future generations." The Pahranagat NWR and Key Pittman WMA underlie NTTR airspace. Noise levels range from 57 to 59 dB L_{dnmr}.

Sections of privately owned land also occur under NTTR airspace in and around communities including Alamo, Hiko, Caliente, Panaca, Pioche, and others. A planned development in Coyote Springs is also east of NTTR ranges (refer to Figure 3.6-4). Baseline noise levels in these areas range from 57 to 59 L_{dnmr}.

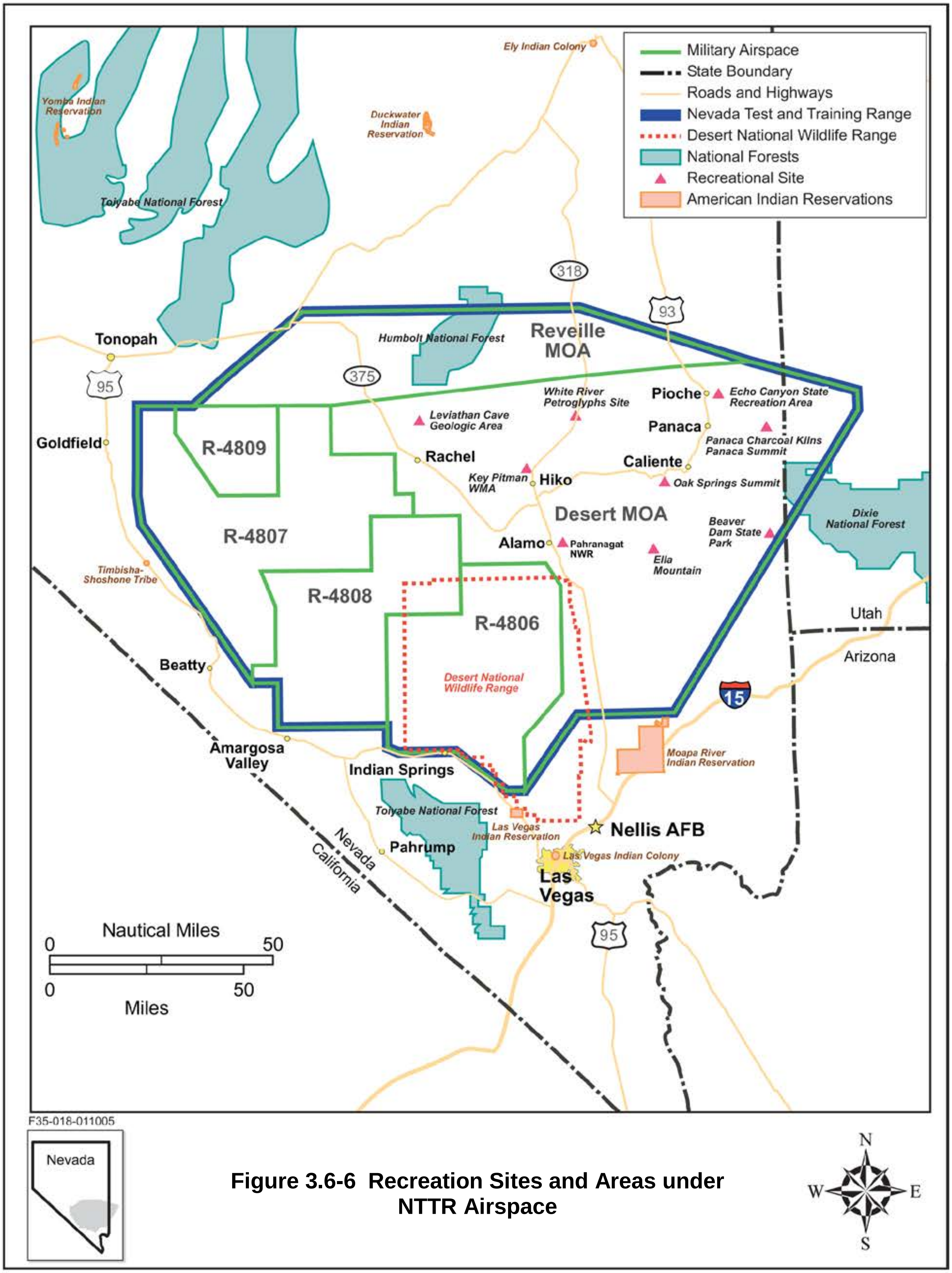


Figure 3.6-6 Recreation Sites and Areas under NTTR Airspace

3.7 SOCIOECONOMICS AND INFRASTRUCTURE

Socioeconomics is defined as the social and economic activities associated with the human environment, particularly population and economic activity. Economic activity typically includes employment, personal income, and industrial growth. Impacts on these two fundamental socioeconomic indicators can also influence other components such as housing availability and public services.

Socioeconomic data are presented at the county level in order to analyze baseline socioeconomic conditions in the context of county trends. Data have been collected from previously published documents issued by federal, state, and local agencies; from state and national databases (e.g., U.S. Census Bureau (USCB); University of Nevada Center for Business and Economic Research; Clark County Finance and Public Works; and from Nellis AFB (e.g., the base's Public Affairs Office).

Analyses of impacts to socioeconomic characteristics potentially resulting from implementation of the proposed action require establishment of an affected environment–a primary geographical area within which direct and indirect socioeconomic effects of the F-35 FDE program and WS beddown would be noticed. Because direct socioeconomic effects associated with implementation of the proposed beddown would occur in the immediate vicinity of Nellis AFB and since infrastructure resources are generally influenced by the socioeconomic environment, the primary focus of this analysis is Clark County.

3.7.1 Population

Nevada maintains the fastest growing state in the U.S. It has maintained a 25 percent or better growth since 1960 (USCB 2011a). Over the past 10 years, Nevada's population has increased from 1,998,257 people in 2000 (USCB 2000a) to approximately 2,700,551 in 2010 (USCB 2011b), representing a 35 percent population growth. As for Clark County, it supports 75 percent of the state's population and has grown about 42 percent, from 1,375,738 in 2000 (USCB 2000b) to 1,951,269 in 2010 (USCB 2011b).

3.7.2 Employment and Earnings

Clark County employment sectors with the greatest number of jobs in 2009 included arts, entertainment, recreation, accommodations and food services; education, health care, and social assistance; retail trade; and construction (USCB 2009a).

Nellis AFB is among the area's largest employers with a workforce that totaled 12,975 personnel in FY08 (Air Force 2008). Personnel included 8,636 active duty military, 3,748 non-appropriated contract civilians and private business employees, and 591 appropriated civilians. The total annual payroll expenditures in FY08 were more than $922 million. The Air Force estimates that the economic stimulus of Nellis AFB created approximately 5,698 secondary jobs in the civilian economy generating over $218

million in the local region. Nellis AFB also purchased considerable quantities of goods and services from local and regional firms. Construction costs; service contracts; and materials, supplies, and equipment for the base totaled over $867 million. In total, Nellis AFB contributed over $3.3 billion to the local economy in FY08. Also generating substantial economic activity are over 27,600 military retirees who receive and spend payrolls exceeding $598 million in the region (Air Force 2008). As one of the single largest government employers in Clark County, Nellis AFB and its continuing operations represent a significant source of regional economic activity.

3.7.3 Infrastructure

Housing

Since Clark County has been one of the fastest growing counties in the United States, the rapid population growth also included a corresponding increase in the demand for affordable, quality housing in the region. The housing stock in Clark County increased 39 percent from 559,799 units in 2000 (USCB 2000c) to 777,520 units in 2009 (USCB 2009b). From 2000 to 2005, an annual average of 11,889 building permits for residential and apartment buildings were issued, with single family residences accounting for 95 percent of the residential buildings permits issued during that time period (Clark County 2011). Due to the severe downturn in the construction industry between 2006 and 2009, the annual average of residential building permits fell to 5,218, resulting in a 56 percent decrease in new residential development. Single family residences still accounted for 95 percent of the residential buildings permits issued during that time period (Clark County 2011). The housing vacancy rate for Clark County was about 8.5 percent in 2000 (USCB 200c) and in 2009, 13.5 percent (USCB 2009c).

Currently, housing on Nellis AFB is available in military family housing units, dormitories, and billeting facilities. A total of 1,224 two-, three-, and four-bedroom homes are currently available to Nellis AFB personnel and their families with an additional 1,074 beds in 13 base dormitories. Billeting facilities are also available for families (60 units), visiting airmen, and visiting officers. In FY08, approximately 2,010 active duty military personnel lived on Nellis AFB; approximately 6,626 active duty military personnel relied on off-base housing (Air Force 2008).

Nellis AFB transferred ownership of the military family housing units to a private developer under a lease agreement. The developer would demolish 951 units, construct 851 new units, and renovate 350 existing units with military construction funding. The construction and renovation activities are expected to be complete in FY11. When complete, a total of 840 two- and three-bedroom homes and 338 four-bedroom homes would be available to Nellis AFB military families, for a combined total of 1,178 housing units (Air Force 2005d).

Public Schools

Public school district boundaries in southern Nevada correspond with county boundaries (i.e., the Clark County School District [CCSD] includes all public schools located within the geopolitical boundaries of Clark County). As the overall population of the affected environment continues to increase, there has been a corresponding increase in enrollment and construction of new schools. At the start of the 2010/2011 school year, a total of 357 public schools were operating in the CCSD with an estimated enrollment of 309,893 students (CCSD 2010). The Lomie G. Heard Elementary School is the only school on Nellis AFB. The school, which is included in the CCSD, accommodates about 800 students. The base has two child development centers with sufficient capacity to accommodate a combined total of about 490 children per day (personal communication, Omohundro 2005).

While a large federal installation such as Nellis AFB contributes greatly to the local economy, it also removes a large tax base used to supplement education costs such as purchase of textbooks, computers, utilities, and teacher and administrative staff salaries. Impact Aid is a federal program that provides funding for a portion of the educational costs of U.S. military dependents. The program essentially pays a tax bill directly to a local school district due to the presence of a military installation. To qualify for the Impact Aid, a school district must have at least 400 federal students in their average daily attendance or at least 3 percent of all children in the school district's average daily attendance must be federally-connected. The amount of Impact Aid varies depending on whether the military family resides on the installation or off base in the local community. The CCSD meets the qualifications for federal Impact Aid.

Utilities

Electric Power and Natural Gas

The Nevada Power Company, a subsidiary of Sierra Pacific Resources, provides the majority of electric power to the base. A small percentage of electrical power generated by the Hoover Dam is provided to Nellis AFB by Western Area Power Administration (personal communication, Blazi 2006). Power is distributed throughout the base via 718,319 linear feet of above-ground cable, and another 1,175,415 linear feet of underground cable. Pole and pad-mounted transformers step down the 12.47 kilovolts power to the voltages that are required by the various facilities. Nellis AFB has indicated that the current electrical system is adequate, due to improvements made since 2003 (Air Force 2007). The Southwest Gas Company provides natural gas to Nellis AFB; a supply line distributes gas to areas of the base via 206,000 linear feet (almost 40 miles) of polyethylene pipelines. The base maintains three 1,000-cubic-foot cylinder tanks of natural-gas storage to refuel government vehicles. Gas supply is adequate to meet existing and projected demand (Air Force 2007).

Potable Water

Nellis AFB's potable water sources include five government-owned and operated wells and water purchased from Southern Nevada Water Authority via bulk-supply pipelines from Lake Mead. A small

quantity is also purchased from the City of North Las Vegas Water District. Nellis AFB is allotted 7.1 million gallons per day (gpd) of surface and ground water (personal communication, Roe 2007). The total existing potable water storage is 7.5 million gallons. Nellis AFB base average water demand is 3.6 million gpd, with peaks of 7.8 million gpd primarily due to increased demand for irrigation water in the summer months (Air Force 2007).

Wastewater Treatment

Nellis AFB discharges approximately 1.5 million gpd of sanitary sewage from the base to the Clark County Water Reclamation District (CCWRD) for treatment. This equates to about 90 to 95 percent of the base sanitary sewage. Industrial wastewater (i.e., aircraft wash water) from the flightline is also discharged through the sanitary sewer system to the CCWRD for treatment with the sanitary wastewater (Air Force 2007). CCWRD treats 170 million gpd at several facilities; the Main Facility services Nellis AFB's wastewater. The Main Facility's capacity is currently 110 million gpd (CCWRD 2011). The treated sewage is released into the Las Vegas Wash where it flows underneath Lake Las Vegas eventually emptying into Lake Mead (Air Force 1999b).

Transportation

Transportation resources refer to the infrastructure and equipment required for the movement of people, raw materials, and manufactured goods in geographic space. Particular emphasis for this analysis is given to the road networks. Transportation resources were analyzed on Nellis AFB only. Since no effect to transportation was expected due to overflights and noise, no further analysis of transportation resources in NTTR was conducted.

For transportation resources, the affected environment includes the roadway network on Nellis AFB, and those roads likely to be used for base access. Nellis AFB is near several major highways. Regional access to the base is provided by Interstate 15 (I-15) via exits at Craig Road from the west, Las Vegas Boulevard from the north, and Nellis Boulevard to the south. From the base, I-15 may be reached via Craig Road or Las Vegas Boulevard; the Craig Road intersection with I-15 is the interchange closest to the base, located approximately 2.5 miles west of the main gate. Cheyenne Avenue intersects I-15 approximately 4 miles west of the base and ends at the base's southwest boundary, near the base golf course.

The roads within Nellis AFB form a network independent from the surrounding vicinity. A 2006 traffic study (Air Force 2006b) investigated the general traffic flow throughout Nellis AFB and looked specifically at 16 intersections and 10 areas of the base that have potential traffic congestion or safety issues. Traffic counts were taken at these intersections at peak periods to establish base traffic demand. Data were used to evaluate and quantify existing traffic problems. The study indicated numerous intersections of particular concern to warrant either a signal light, roundabout, or realignment: the intersections of Beale and Ellsworth Avenues; four intersections along Washington Boulevard; Ellsworth

Avenue and Fitzgerald Boulevard; Tyndall Avenue, March Boulevard, and Delvin Drive; Duffer Drive and Rickenbacker Road; Tyndall Avenue and Kinley Avenue; and Hollywood Road. The study also revealed traffic delays at the Main Gate at the intersections of Fitzgerald Boulevard, Las Vegas Boulevard, and Craig Road and at the Tyndall Gate at the intersection of Tyndall Avenue, Nellis Boulevard, and Gowan Road. This study concluded that adverse transportation conditions exist at the Tyndall Gate and recommended retiming of the existing signal light. The remainder of the traffic issues could be resolved by better usage of lanes, signs, and crosswalks, according to the study.

3.8 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

In 1994, Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued to focus attention of federal agencies on human health and environmental conditions in minority and low-income communities and to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed. To provide a thorough environmental justice evaluation, this section gives particular attention to the distribution of race and poverty status in areas potentially affected by implementation of the proposed action. For this analysis, minority and low-income populations are defined as follows:

- ***Minority Populations*****:** Persons of Hispanic origin of any race; African Americans; American Indians, Eskimos, and Aleuts; and Asians or Pacific Islanders.
- ***Low-Income Populations*****:** Persons living below the poverty level, based on a total annual income of $20,000 for a family of four as reported in the *2006 Federal Poverty Guidelines* (U.S. Department of Health and Human Services).

Estimates of these two population categories were based on data from the 2011 for population demographics (USCB 2011b). Although the census does not report “minority” population as a class, it reports population by race and ethnic origin; therefore, populations other than white were defined as minority. For low-income populations, 2009 population estimates for Clark County were used because 2010 census data are not yet available at this level of detail (USCB 2009c).

In 1997, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)*, was issued to ensure the protection of children. Socioeconomic data specific to the distribution of population by age and the proximity of youth-related developments (e.g., day care centers and schools) that could potentially be incompatible with the proposed action is presented. Data used for protection of children analysis were derived from the *2009 Clark County QuickFacts from the U.S. Census* (USCB 2009d); this level of detail has yet to be released in the 2010 U.S. Census.

The analysis of environmental justice considers changes in airfield noise levels created by the proposed action for the base and vicinity but not areas near NTTR or under the airspace. The existing area affected by noise levels of 65 DNL or greater for which population could be affected overlies land areas on Nellis AFB in Clark County. Baseline noise contours used are found in section 3.3 and are illustrated on page 3.3-7, Figure 3.3-1.

Nellis AFB

Minority and Low-Income Populations

Although open land makes up the largest percentage of lands affected by noise, residential areas (i.e., homes) to the west of Nellis AFB are also affected. Existing land use in the vicinity of Nellis AFB currently affected by aircraft noise is discussed in detail in section 3.6.

Clark County Population (percent of total)		
2010 Estimated Total[1]	1,951,269	
2010 Estimated Minority[1]	763,157	(39%)
2009 Estimated Low-Income[2]	233,890	(12%)

Sources: [1]USCB 2011b and [2]USCB 2000d.

While no residential areas are located within clear zones associated with Nellis AFB, substantial tracts of residential land are located within APZs I and II and have been located within these areas since before 1992. Over at least the last two decades, residential and other incompatible land uses have been permitted within areas adjacent to Nellis AFB that are subjected to noise levels greater than 65 dB DNL. Clark County zoning ordinances have restricted land uses in these areas; however, encroachment by residential development continues to be a problem. One community that continues to be affected by noise resulting from Nellis AFB activities is Sunrise Manor, an unincorporated town. Portions of Sunrise Manor are immediately west and south of Nellis AFB.

Table 3.8-1 displays the total population, total minority population, percentage minority, total low-income population, and low-income percentages for the affected areas in the vicinity of Nellis AFB with baseline noise greater than 65 dB DNL. Minority and low-income populations in the affected areas are then compared with the total population of Clark County. Census block data were used to identify these specific populations within the noise contour bands; the only comparable data set from which this information could be drawn was derived from the *2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate and 2005 Population Estimates* (USCB 2006). Census block data at this level of detail are not yet available from the 2010 Census.

Table 3.8-1 Minority and Low-Income Populations in the Vicinity of Nellis AFB in Clark County with Baseline Noise Greater than 65 DNL

DNL	***Total[1] Population***	***Minority[1] Population***	***Percent Minority***	***Low-Income[2] Population***	***Percent Low-Income***
65 - 70	26,094	20,026	77%	3,928	18%
70 - 75	12,823	8,937	70%	1,424	16%
75 - 80	1,784	1,176	66%	53	9%
80 - 85	246	115	47%	1	8%
> 85	9	4	40%	0	9%
Total	**40,957**	**30,257**	**74%**	**5,406**	**18%**

Sources: [1]USCB 2006 – based on 2005 Population Estimates and 2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate, July 2005.

Based on the data, in the area surrounding Nellis AFB, approximately 30,257 people were estimated to be affected by noise levels above 65 dB DNL. Out of that total, roughly 74 percent are considered to be minorities, and 18 percent have low-incomes. Under baseline conditions, when compared to the percent minority populations in Clark County (i.e., 39 percent) those affected by noise levels above 65 dB DNL is greater than the county's overall 2010 average. The proportion of the minority populations in the same area has grown by 16 percent since the 2000 census, and as noted in the Draft EIS. There is also an average of 6 percent more low-income populations affected by noise levels greater than 65 dB DNL when compared to total low-income populations found in Clark County. The Air Force continues to actively work with the community to minimize and avoid noise impacts to these populations through their AICUZ program, public outreach, and flight restrictions.

Protection of Children

In 2009, the number of Clark County residents estimated to be under the age of 18 was 500,445 representing approximately 26 percent of the total population (USCB 2009d). Residential development exists in the vicinity of Nellis AFB within areas exposed to unacceptable noise levels (see Figure 3.3-1) and in established APZs (see Figure 3.5-1). Encroachment in the APZs by residential development continues despite ordinances restricting certain land uses. The Air Force continues to actively work with the community to minimize and avoid noise impacts to these populations through their AICUZ program, public outreach, and flight restrictions.

The Nellis Terrace Housing Area and Lomie G. Heard Elementary School, both located in Area I of the base, are subject to 70 dB DNL and greater noise levels; however, noise attenuating materials were used to minimize potential effects. No environmental restoration sites occur at locations on the base where they could pose a potential health risk to affected groups of children.

3.9 SOILS AND WATER RESOURCES

The principal factors influencing stability of structures are soil and seismic properties. Soil, in general, refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support structures and facilities. Relative to development, soils typically are described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use.

Water resources include surface and ground water. Lakes, rivers, and streams comprise surface water resources that are important for economic, ecological, recreational, and human health reasons. Groundwater is used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Attributes of water resources considered in this EIS include hydrologic setting, availability, use, quality (including protection zones), floodplains, flood hazard, and adjudicated claims to water rights for both surface and groundwater. The Clean Water Act (CWA) of 1972 is the primary federal law that protects the nation’s waters, including lakes, rivers, and aquifers. The primary objective of the Act is to restore and maintain the integrity of the nation’s waters. Jurisdictional waters of the U.S. are regulated resources and are subject to federal authority under Section 404 of the CWA. This term is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands.

Criteria for water quality within the State of Nevada are contained in the Nevada Administrative Code (NAC), Chapter 445A.119, and apply to existing and designated beneficial uses of surface water bodies. Water quality standards are driven by the beneficial uses of specific water bodies. Beneficial uses include agriculture (irrigation and livestock watering), aquatic life, recreation (contact and non-contact), municipal or domestic supply, industrial supply, and wildlife propagation.

The State of Nevada has adopted drinking water standards established by the EPA, under the Safe Drinking Water Act. The Nevada Department of Health regulates drinking water quality for public supply systems. Drinking water standards consist of maximum contaminant levels established for various water quality constituents to protect against adverse health effects.

General soils and water information pertains to all areas where proposed F-35 construction projects would occur. All areas are located within the southern Las Vegas sub-basin of the Great Basin, the northernmost subprovince of the Basin and Range Physiographic Province. This province is generally characterized by regularly spaced, north-south trending mountain ranges that are separated by internally-draining alluvial basins or playas. The elevations of mountains and intervening valleys generally increase from south to north. The physiographic Great Basin subprovince overlaps all of the ecological Great Basin Desert and

extends farther in a few locations in northeastern California and southeastern Oregon and in southern Nevada near Las Vegas and Lake Mead. With the exception of the Lake Mead area, the Great Basin subprovince drains internally; precipitation has no surface water outlet to the Pacific Ocean.

The Sierra Nevada mountains, stretching along Nevada's western border, interrupt the prevailing easterly flow of storm systems and minimize precipitation, resulting in a "rain shadow." Surface water is sparse in Nevada. Typically, as much as 75 percent of Nevada's precipitation falls during the winter. The scarcity of surface water resources is attributed to a dry regional climate characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average precipitation depends mainly on elevation and ranges from 4 inches on the desert floor to 16 inches in the mountain areas. With the exception of locally intense thunderstorms that can produce flash flooding, much of the warm weather precipitation is lost to the atmosphere through evaporation and transpiration. Flash floods produce high peak flows over short periods of time.

Nevada's groundwater is typically found in unconsolidated deposits of sand, gravel, silt, and clay that partly fill the many basins. Most groundwater development is in basins where water is readily obtained from shallow unconsolidated deposits where well yields are more predictable than in the mountains. Groundwater use has been discussed previously in section 3.7.

Because direct effects to soil and water resources associated with implementation of the proposed F-35 FDE and WS beddown would occur at and near Nellis AFB, and since no new construction would occur on NTTR, the focus of this analysis is Nellis AFB.

3.9.1 Soils

Nellis AFB is located in the southern part of the Las Vegas Valley. The elevation of Nellis AFB is about 2,000 feet above sea level. The ground surface over most of Nellis AFB is disturbed by man-made features, such as airfields, roads, and buildings. Nellis AFB is relatively flat; over most of the base, including the vast majority of the developed areas, slopes are 1 percent or less.

Nellis AFB lies primarily on two types of soil, the Las Vegas-Destazo complex and the Las Vegas-Skyhaven complex (USDA 1985). These soils are very similar physically and chemically. Las Vegas soils comprise 60 percent of Nellis AFB, soils and Skyhaven and Destazo soils together comprise 25 to 30 percent, leaving 10 to 15 percent McCarran-Grapevine complex, Weiser-Goodsprings complex, and Glencarb silt loam. The main soil types share the following attributes:

- moderately slow permeability;
- slight potential for water erosion;
- high potential for wind erosion; and
- a shallow hardpan layer that limits construction.

These attributes indicate that ground disturbance at Nellis AFB, such as construction, could lead to a high degree of wind erosion. Erosion from precipitation and runoff is rare, due to soil characteristics, lack of slope on Nellis AFB, and minimal amounts of precipitation.

3.9.2 Water Quality and Stormwater

The Las Vegas Valley extends in a northwest-southeast direction and drains toward the south through the Las Vegas Wash into Lake Mead. Nellis AFB lies in the southern portion of the Las Vegas Valley within the Colorado River Basin. Natural surface waters and perennial streams are nonexistent. No 100-year floodplains occur within the developed portions of the base. The little precipitation that is captured is drawn into the valley's principal basin-fill aquifer, shallow aquifers, and the Colorado River.

Nellis AFB is underlain by carbonate rock aquifers of the Death Valley and Colorado aquifer systems (USGS 1997), which are hydrologically connected to shallower alluvial aquifer systems composed of sand and gravels. The principal aquifer in the Las Vegas Valley hydrologic basin is naturally recharged by 30,000 to 35,000 acre feet per year (afy) mostly from the Spring Mountains on the west valley boundary. Recharge of the shallow aquifers is also occurring, primarily as a result of irrigation water percolating into the ground.

Surface water is transported to Nellis AFB by pipelines from Lake Mead. No natural lakes or other open bodies of water, excluding manmade impoundments, are found on Nellis AFB. A few ephemeral streams occur on base (personal communication, Roe 2007), particularly in Area II. However, low precipitation, a lack of slope, and the absence of streams create a context where the potential for water erosion is rare.

Sources of groundwater are available from the principal alluvial-fill aquifer underlying the Las Vegas Valley. In addition to those on base, wells occur in both the northwest part of the valley from the Las Vegas Valley Water District/Southern Nevada Water Authority and in the northern end of the valley from North Las Vegas Water District. The existing water supply at Nellis AFB is considered adequate (Air Force 2002a).

Piped surface and ground waters support base personnel and operations. This includes water for drinking and sewage systems, fire utilities, maintaining landscapes, and construction. Nellis AFB drinking water standards are established by the EPA under the Safe Drinking Water Act, also adopted by the State of Nevada. Drinking water quality for public supply systems is regulated by the Nevada Department of Health. Maximum contaminant levels have been established for various water quality constituents to protect against adverse health effects. All water sources for Nellis AFB meet EPA and State of Nevada standards.

Nellis AFB's potable water sources include five active government-owned and operated wells and water purchased from Southern Nevada Water Authority via bulk-supply pipelines from Lake Mead. The base also purchases a small quantity from the City of North Las Vegas Water District. Approximately 29 percent of the Nellis AFB water supply comes from groundwater, and the base is allotted 7.1 million gdp of surface and ground water (personal communication, Roe 2007). Nine storage tanks for potable water exist at Nellis AFB, with a total existing potable water storage capacity of 7.5 million gallons. Nellis AFB's average daily water usage varies between 2.5 million gpd between October and April to 5.4 million gpd from May to September (Air Force 2003a).

Stormwater runoff on Nellis AFB is drained by three outfalls: one each in Area I, Area II, and Area III. Outfall 001 in Area I drains the main base; the discharge is diverted through channels to the Las Vegas Wash which eventually flows into Lake Mead. The drainage area of Outfall 001 includes about 44,000 acres of off-base and 10,760 acres of on-base property. Outfalls II and III consist of small brooks and swales which drain the eastern portion of the WSA and a small portion of the Defense Reutilization and Marketing Office (DRMO) (Air Force 2002a).

Under the CWA, facilities that discharge stormwater associated with industrial activity must apply for a stormwater permit; the State of Nevada is the EPA-designated permitting authority. Nellis AFB has authorization, under the NDEP General Permit No. NVS040000 (Stormwater Discharges from Small Municipal Separate Storm Sewer Systems), to discharge its stormwater through the base's three outfalls (NDEP 2010). NDEP does not require NTTR to perform stormwater sampling (Air Force 2002a).

3.10 BIOLOGICAL RESOURCES

Biological resources encompass plant and animal species and the habitats within which they occur. Plant species are often referred to as vegetation and animal species are referred to as wildlife. Habitat can be defined as the area or environment where the resources and conditions are present that cause or allow a plant or animal to live there (Hall *et al.* 1997). Biological resources for this EIS include vegetation, wetlands, wildlife, and special-status species occurring in the vicinity of the proposed construction projects on Nellis AFB and in NTTR where they could be potentially affected by noise generated from overflights.

Vegetation. Vegetation includes all existing upland terrestrial plant communities with the exception of wetlands or special-status species. The affected environment for vegetation includes those areas subject to demolition and construction ground disturbance.

Wetlands and Jurisdictional Waters of the United States. Wetlands and jurisdictional waters of the U.S. are considered special category sensitive habitats and are subject to regulatory authority under Section 404 of the CWA and Executive Order 11990 *Protection of Wetlands.* They include jurisdictional and non-jurisdictional wetlands. Jurisdictional wetlands are those defined by the United States Army Corps of Engineers (USACE) and EPA as those areas that meet all the criteria defined in the USACE's 1987 *Wetlands Delineation Manual* and under the jurisdiction of the USACE (USACE 1987). Wetlands are generally associated with drainages, stream channels, and water discharge areas (natural and man-made). The discussion of impacts pertains to the potential to affect wetlands and jurisdictional waters of the U.S. due to construction or demolition activities under the proposed action.

Wildlife. For the purposes of this EIS wildlife includes all vertebrate animals (i.e., fish, amphibians, reptiles, birds, and mammals) with the exception of those identified as threatened, endangered, or sensitive species. Wild horses and burros are also included and protected by PL 92-195, the Wild Free-Roaming Horse and Burro Act of 1971, as amended. Wildlife potentially affected by demolition and construction activities and overflight noise will be discussed.

Special-Status Species. Special-status species are defined as those plant and animal species listed as threatened, endangered, or proposed as such by the USFWS. The federal Endangered Species Act (ESA) protects federally listed, threatened, and endangered plant and animal species. Species of concern are not protected by the ESA; however, these species could become listed and protected at any time. Their consideration early in the planning process could avoid future conflicts that might otherwise occur. The discussion of special-status species focuses on those species with the potential to be affected by demolition, construction, and construction-related noise. Appendix F lists the special-status species in the potentially affected areas.

The affected environment for biological resources includes those areas within each location potentially affected by ground-disturbing activities such as demolition, construction, or infrastructure development. All baseline data were gathered from previous studies such as the *Integrated Natural Resource Management Plan for Nellis Air Force Base* (Air Force 1999c) and *Renewal of the Nellis Air Force Range Land Withdrawal Legislative Environmental Impact Statement* (Air Force 1999b), and *Nevada Training Initiative Environmental Assessment* (Air Force 2003b).

3.10.1 Nellis AFB

Vegetation

Nellis AFB is located in the Mojave Desert. Large expanses of the valley floors in the Mojave Desert support the creosote bush (*Larrea tridentate*)/white bursage (*Ambrosia dumosa*) desert scrub community. The creosote bush and white bursage dominate plant communities at elevations from below sea level to about 3,940 ft (Air Force 1992b; Hazlett *et al*. 1997). This desert scrub community, characteristic of much of the Mojave Desert can still be found in the less developed areas of Nellis AFB, such as the eastern portion of Area II. Tamarisk or salt cedar (*Tamarix* spp.) is an introduced, non-native perennial plant species that has had a notable effect on plant associations. Tamarisk is known for releasing salt into surrounding soils which, in combination with the plant's aggressive growth and colonization, often results in establishment of monospecific and dense stands that often preclude establishment of native species. Nellis AFB has an aggressive program to eradicate Tamarisk from the installation. Traditionally, non-native drought-tolerant deciduous trees and shrubs, evergreen trees and shrubs, perennials, ground covers, vines, and grasses have also been planted throughout the base; however, over the past several years the focus has been on planting native vegetation. Introduced native and non-native vegetation are contained mostly within and adjacent to developed areas at the base (Air Force 1999c). Las Vegas buckwheat (*Eriogonum corymbosum*), a plant state species of concern, is present on gypsiferous soils in three different locations on Nellis AFB and discussed in detail in the special-status species section under Nellis AFB.

Wetlands and Jurisdictional Waters of the United States

Potential wetlands and jurisdictional waters of the U.S. on Nellis AFB consist of the golf course ponds and a few ephemeral streams. USACE personnel have determined that the golf course ponds are man-made water sources and not subject to wetlands and jurisdictional water protection under the provisions of the CWA because they are man-made and the water source is not natural (Air Force 1999c). Because the Las Vegas Wash is connected to the Colorado River, any ephemeral streams and washes eventually emptying into the Las Vegas Wash could be considered jurisdictional under Section 404 of the CWA. Any action that would result in the placement of fill in those streams would require consultation with the USACE (Air Force 1999c).

Wildlife

Due to its location adjacent to metropolitan Las Vegas and previous development and construction activities, Nellis AFB is primarily an urban environment with some relatively undisturbed lands lying to the east and north of the base. Wildlife species found on base are mostly limited to those that have adapted to high levels of human activity and disturbance. Three general habitat types are present on the base: urban areas, open space recreation (e.g., golf course), and native desert scrub vegetation. Common bird species in the urban areas include house finch and house sparrow. Open spaces are frequented by American coot (*Fulica americana*), horned lark (*Eremophila alpestris*), great-tailed grackle (*Quiscalus mexicanus*), and domestic geese and ducks. The western burrowing owl (*Athene cunicularia hypugaea*) is a species native to southern Nevada and adapts well to urban environments. The owl prefers flat, previously disturbed areas like those found around the southern boundary of Nellis AFB, including edges of concrete flood control channels, for the excavation their burrows and are commonly found on the base.

The areas with the most diverse wildlife are those containing native desertscrub vegetation. Area II (refer to Figure 2-1) comprises the most undisturbed native desertscrub habitat on the base. Coyote (*Canis latrans*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), phainopepla (*Phainopepla nitens*), desert spiny lizard (*Sceloporus magister*), banded Gila monster (*Heloderma suspectum cinctum*), and side-blotched lizard (*Uta stansburiana*) are wildlife species found in Clark County. The chuckwalla (*Sauromalus ater*), a large lizard, has been confirmed present on the base due to observation of scat on the rocky hillsides of the eastern portion of Area II. The chuckwallas inhabit rocky hillsides, talus slopes, and rock outcrops in areas dominated by creosote. Rocks and their associated crevices provide shelter and basking sites.

Special-Status Species

Only one federally-listed animal species, the desert tortoise (*Gopherus agassizii*), is present on the base in low densities in undeveloped portions of Area II. The desert tortoise is the largest reptile in the arid southwestern U.S. Tortoises spend much of their lives in underground burrows they excavate to escape the harsh summer and winter desert conditions. They usually emerge in late winter or early spring and again in the fall to feed and mate, although they may be active during summer when temperatures are moderate. Desert tortoises are herbivorous, eating a wide variety of herbaceous vegetation, especially flowers of annual plants. Historically the tortoise occupied a variety of desert communities in southeastern California, southern Nevada, western and southern Arizona, southwestern Utah, and through Sonora and northern Sinaloa, Mexico. Today it can still be found in these areas, although the populations are fragmented and declining over most of its former range (Air Force 1999c).

A USFWS programmatic biological opinion (BO) (USFWS 2007), which covers the desert tortoise population over a 5-year period in Areas I, II, III, and the Small Arms Range, stated that programmatic

activities proposed by the Air Force "…is not likely to jeopardize the continued existence of the threatened Mojave population of the desert tortoise…" The USFWS issued reasonable and prudent measures, including implementing terms and conditions designed to minimize incidental take in Areas I, II, III, and the Small Arms Range. According to 50 CFR 402.16, any new Air Force action that may affect the desert tortoise, not considered in previous biological opinions, would require reinitiation of consultation with the USFWS. The biological opinion also noted that Area I contains no desert tortoises or desert tortoise habitat. Only one plant, a state species of concern, has been observed or occurs on Nellis AFB, the Las Vegas buckwheat.

3.10.2 Nevada Test and Training Range

Vegetation

Due to differences in habitats, the North and South ranges support somewhat different biological resources. The North Range is a transitional area between the Mojave Desert and Great Basin that supports a mixture of community types, including creosote bush scrub, Joshua tree woodland, pinyon-juniper woodland, mixed desert scrub community, Great Basin sagebrush scrub, black sagebrush scrub, and a sparsely vegetated rock outcrop community (Air Force 1999c). Farther north, the North Range fully transitions to the Great Basin Desert, dominated by sagebrush and saltbush vegetation. The vegetation of the basin floors of the North Range is typified by shadscale (*A triplex confertifolia*) and greasewood (*Sarcobatus baileyi*) and may include winter fat (*Ceratoides lanata)* and green molly (*Poecilia sphenops*). Most of the middle- and upper-elevation bajadas are dominated by the sagebrush/pinyon/juniper community. Additional species that occur in this community include: rabbitbrush (*Chrysothamnus greenei ssp. Filifolius)*, joint fir (*Ephedra* spp.*)*, and occasional Joshua trees (*Yucca brevifolia*). Scattered Utah juniper (*Juniperus osteosperma*) can occur on the flanks near the upper limit of sagebrush vegetation. The dominant vegetation type in the North Range mountains, above approximately 5,000 feet, is pinyon juniper woodland, with big sagebrush dominating the shrub layer. White fir occurs at elevations above approximately 8,000 feet, with single leaf pinyon and limber pine (Air Force 1999c).

The South Range lies in the northeastern portion of the Mojave Desert. Creosote bush white bursage and saltbush communities are the most common vegetation communities on the South Range. Where soils are especially alkaline and clay-rich, as on the margins of dry lake beds (playas) at the lowest elevations, saltbush species including four-wing saltbush (*A. canescens*), cattle-spinach (*A. polycarpa*), and shadscale dominate the vegetation. Saltbush communities, especially near playas, may consist exclusively of these species. Vast areas of the basins and bajadas in the Mojave Desert, below approximately 4,000 feet, support plant communities dominated by creosote bush and whitebursage. Saltbush species, ephedras, brittlebush (*Enceliavirginensis*), desert mallow (*Sphaeralcea ambigua*), cacti (especially prickly pears and

chollas [*Opuntia* spp.]), and Mojave yucca (*Yucca shidigera*) may also occur in this community (Air Force 1999c).

At higher elevations (approximately 4,000 to 6,000 feet) the blackbrush community may predominate. This community includes blackbrush (*Coleogyne ramosissima*), ephedras, turpentine-broom (*Thamnosma montana*), and range ratney (*Krameria parvifolia*). Joshua tree is another plant that may occur at higher elevations within the creosote bush white bursage and the blackbrush communities. The sagebrush pinyon juniper community comprises a woodland that is present on the South Range and is distinctive of the higher elevations of the Mojave and Great Basin Deserts above at least 4,900 feet elevation, and usually above 5,900 feet (Air Force 1999c).

Wetlands and Jurisdictional Waters of the United States

The Wetlands Report (Air Force 1997b) surveyed the NTTR and identified numerous seeps, springs, and ephemeral streams. It has not been determined if these waters are jurisdictional waters of the U.S. and they will need to be assessed in light of the Supreme Court's 2002 Stormwater Agency of Northern Cook County and the 2006 Rapanos v. U.S. and Carabell v. U.S. known as Rapanos decisions. Mapping of wetlands and jurisdictional waters of the U.S. in the NTTR remains incomplete.

Wildlife

Wildlife in the vicinity of the North Range includes species that are primarily associated with Great Basin montane scrub, pinyon juniper woodland, Great Basin desert scrub, desert springs, and open water habitats. These habitats support numerous wildlife species including several species considered sensitive by state and federal governments. Most of the North Range comprises Great Basin habitats, the exceptions being in the southwestern corner, which is part of the transition between Mojave and Great Basin deserts. As a result, many (but not all) wildlife species associated with both Mojave and Great Basin habitats occur in this area.

Wildlife species associated with Mojave Desert transitional habitats found in the North Range are similar to those found in the South Range. Most of the common, larger mammal species that occur in the North Range habitats are similarly found in the South Range. A population of bighorn sheep (*Ovis Canadensis*) inhabits on Stonewall Mountain, Cactus Range, and Pahute Mesa in the North range. In the South Range, Bighorn Sheep inhabit the Spotted, Pintwater, Sheep, and Desert Ranges. In addition, the rougher, more densely vegetated regions in the higher elevations of the North Range also support mountain lion (*Puma concolor*), bobcat (*Felis rufus*), and mule deer (*Odocoileus Hemionus*). Pronghorn antelope (*Antilocapra americana*) and wild horses predominantly occupy the desert scrub communities found in the North Range, particularly in Cactus Flat, on alluvial fans bordering Breen Creek, and in the Kawich Valley.

The rodents of the Great Basin desert scrub habitat differ from those of the southern Mojave desert and include the pallid kangaroo mouse (*Microdipodops pallidus*), dark kangaroo mouse (*M. megacephalus*), sagebrush vole (*Lagarus curtatus*), and chisel-toothed kangaroo rat (*Dipodomys microps*). Several bat species are documented on the range in a NTTR-commissioned bat survey report (Air Force 1999b). Six species of bats, of the 20 species potentially occurring in the area, were documented on NTTR including long-legged myotis (*M. volans*), fringe-tailed myotis (*M. thysanodes pahasapensis*), California myotis (*Myotis californicus*), pipistrelle (*Pipistrellus hesperus*), Townsend's big-eared bat (*Plecotus townsendii*), and pallid bat (*Antrozous pallidus*). The California myotis was the most widespread and commonly observed species in the report and was found in all habitats that were sampled.

Bird species typical of the sagebrush community include the sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), and horned lark (*Eremophila alpestris*). Chukars (*Alectoris chukar*) have been introduced into the area and survive in rocky habitat and desert scrub near freshwater habitat. Raptors, regularly observed in the area, are similar to those found in the Mojave desert scrub in the South Range. The pinyon juniper woodland supports the greatest bird diversities in the region. Reptiles are less abundant in the North Range, which is colder than the Mojave Desert Scrub habitat in the South Range. Some reptile species found in the North Range are also observed in the South Range (e.g., side-blotched and whiptail lizards). Additional species include sagebrush lizard (*Scloperous graciosus*), leopard lizard (*Gambelia wislizenii*), and the Great Basin rattlesnake (*Crotalus viridis lutosis*). Desert tortoise is not found in the North Range. Amphibians on the North Range are restricted to the rare areas near water and include the Great Basin spadefoot toad (*Scaphiopus hammondi*). Native fishes are not known or expected to occur because of the lack of perennial pools of water, of sufficient extent, to sustain populations during drought.

Wildlife species associated with Mojave desert habitats found in the South Range are similar to those described above in the North Range section. Most of the common, larger mammal species that occur in the North Range habitats are similarly found in the South Range.

Special-Status Species

There are 26 state- or federally-listed plant and animal species of concern occurring or potentially occurring within the affected environment of NTTR (USFWS 2010). There are no federally-listed threatened or endangered *plant* species known or likely to occur within NTTR's North and South Ranges where air-to-ground operations are undertaken. The only known federally-listed *wildlife* species known to occur on NTTR ranges is the desert tortoise, which is only found in the southern portion of the South Range. Appendix F provides a list of both federal and state special-status species potentially occurring the NTTR affected environment.

Additional state and federal species of concern may occur on NTTR (see Appendix F). This status category does not confer any specific legal protection, but the Nellis AFB 99 Civil Engineering Squadron, Environmental Management Flight gives consideration to species of concern in ongoing management of NTTR and as part of NEPA compliance. Species of concern and BLM-sensitive species that are known or likely to occur on NTTR include seven species of mammals (six of which are bats), eight species of birds, and two species of reptiles. The majority of these avian species are expected to occur on NTTR only seasonally in small numbers.

The Mojave desert population of the desert tortoise, whose general distribution includes portions of NTTR, was listed as threatened by the USFWS on April 2, 1990. The USFWS attributes the decline of this species to disease, predation from increased raven populations, collecting, vehicle mortalities, and habitat degradation, destruction, and fragmentation. The species' range in this region lies primarily within the Mojave desert scrub habitat at elevations below 4,000 feet. Desert tortoise home ranges vary with location and year, but may cover from 25 to 200 acres. Basic habitat requirements include the quality of forage species, shelter from predators and environmental extremes, suitable soil types for burrowing, nesting and over-wintering, vegetation for cover and shelter, and adequate area for movement and dispersal. These requirements may be met in a variety of plant communities including Joshua tree, Mojave yucca, creosote bush, and saltbush scrub. Tortoises are herbivorous, with the most important food apparently being desert annuals, cacti, and grasses. Desert tortoise mating starts with spring emergence and may continue until fall dormancy. Nesting occurs from May to July. Females dig nests, deposit eggs, and abandon the nest; incubation varies from 90 to 120 days (Revegetation Innovations 1992).

Desert tortoise habitat and burrows are most commonly found within creosote bush scrub communities on flat areas or gently sloping areas, washes, bajadas within valley floors. However, they may also be found in steeper, rockier areas. Soil structure is an important limiting factor for tortoise habitat. Soils must be firm enough to hold burrows, but soft enough to allow digging. A variety of soil types, from sandy to sandy-gravely, may be used.

For NTTR, desert tortoise habitat occurs in the areas of the South Range consisting of Mojave desert scrub. This area within the South Range represents a small percentage of the available desert tortoise habitat within the Northeastern Mojave Recovery Unit. The South Range lies within the extreme northern limits of desert tortoise geographical extent. The NTTR falls within the Coyote Spring Desert Wildlife Management Area (DWMA), which has been designated as part of the recovery units based on the Desert Tortoise (Mojave Population) Recovery Plan. However, NTTR is not part of the designated critical habitat areas. Designated recovery units contain both "suitable" and "unsuitable" habitat. Some areas within NTTR, such as the ordnance impact zones, are located in areas that are considered "unsuitable" or are highly disturbed and do not contain nesting, sheltering, or foraging habitat (USFWS 1994).

Several desert tortoise surveys have been conducted on NTTR South Range. These surveys (Figure 3.10-1) have shown that the southern half of the South Range clearly lies near the northern limits of the desert tortoise range. In this area, population densities are generally lower and populations tend to be "patchy." Surveys of the South Range have shown a range of density from 1 to 45 desert tortoises per square mile population density (USFWS 1994). The following details the methods and results of these surveys.

The most extensive survey was completed during 1992 (Revegetation Innovations 1992) covering approximately 459 square miles and including all areas below 3,600 feet in the Indian Springs Valley, and below 4,000 feet in the Three Lakes Valley, the eastern fringes of Frenchman Valley, and the Nellis Small Arms Range adjacent to Nellis AFB in the Las Vegas Valley. All existing impact areas were surveyed using three 0.5 mile-long transects, 30 feet wide, within each topographic map section. Surveyors recorded any evidence of tortoise or tortoise activity (tracks, eggshells, burrows, carcasses, and scat). This survey found desert tortoise population densities to be very low (0 tortoises per square mile) to low (1 to 3 tortoises per square mile), relative to other parts of the tortoise's range (USFWS 1997). Only 110 of 431, or 25 percent of the transects showed any sign of (burrows, carcasses, scat) or actual presence of the desert tortoise.

In 1990, three surveys, covering 890 acres within South Range were preformed: 1) a 100-percent survey of 560 acres along the southwestern edge of Dog Bone Lake located 5 desert tortoises, 25 active burrows, 3 carcasses, and 26 inactive burrows; 2) another survey of 260 acres did not locate any sign of or actual presence of tortoise; and 3) seven 10-acre sites in Indian Springs and Three Lake Valleys, found no desert tortoise or desert tortoise signs.

A 1993 survey of approximately 70 acres east of Dog Bone Lake, within an impact zone located 2 desert tortoises, 13 active burrows, 6 carcasses, 6 scat, and 24 inactive burrows. This survey used transects similar to those in the 1992 survey of four 40-acre plots. Sixteen additional 10-acre surveys were conducted at sites located within Indian Springs and Three Lakes Valleys. No desert tortoise or sign of tortoise was located at any of these sites.

In 2001, a 100-percent coverage survey was completed for a 7.5-mile corridor proposed for road construction. Three corridor segments were surveyed: two segments totaling approximately 6 miles extended along the west side of Dog Bone Lake within an impact zone. The remaining section was located in the northern portion of the Indian Springs Valley. This survey did not locate any desert tortoise or active burrows and noted evidence of previous disturbance from training activities. Five inactive tortoise burrows were located (Air Force 2003b).

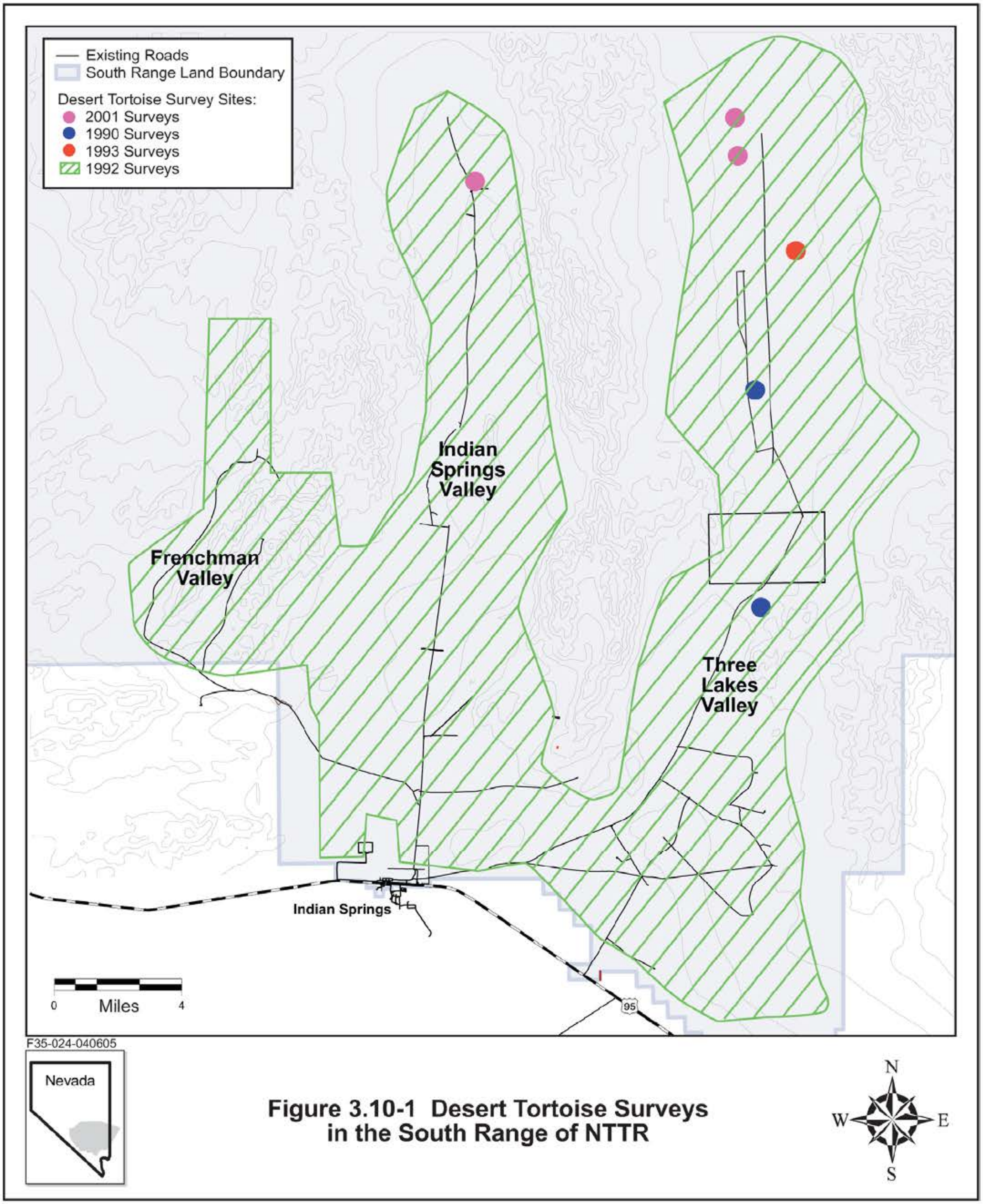


Figure 3.10-1 Desert Tortoise Surveys in the South Range of NTTR

Another survey conducted in June 2002, consisted of a 100-percent presence/absence survey in portions of the South Range. Three live tortoises were observed in burrows, along with fresh tracks of a fourth tortoise. A total of 41 burrows, 14 potential burrows, 13 pallets, 14 scats, 2 carcasses, and 2 sets of desert tortoise tracks were also observed during the June 2002 survey. The survey did not locate any desert tortoise or active burrows in the areas examined in Range 64 (USFWS 2003).

The USFWS programmatic BO, issued on June 17, 2003 (amending the earlier Biological Opinion issued February 5, 1997), concluded that training activities at NTTR would not jeopardize the continued existence of the desert tortoise or destroy or adversely modify critical habitat (USFWS 2003). The Opinion also indicated measures to be taken to minimize desert tortoise mortality or harassment and destruction of habitat which include the following: a maximum speed limit of 25 miles per hour for all regular vehicle travel; no off-road travel with the exception of Explosive Ordnance Disposal (EOD); removal of desert tortoise from areas of impact by a qualified biologist; development of an approved vegetation rehabilitation plan; and a tortoise education program to be given to employees working in tortoise habitat.

No formal surveys for pygmy rabbits have been conducted on the NTTR. During cursory investigations of certain seeps and springs, pygmy rabbit droppings and burrows were observed in sagebrush habitats located on the east side of the Kawich Mountain Range. The extent of pygmy rabbit distribution and population density on the NTTR remains unknown at this time (personal communication, Turner 2006). A bat survey report (Air Force 1999b) documented the presence of three sensitive species of bats on NTTR, Townsend's big-eared bat, fringed myotis, and long-legged myotis. Other bat species such as the western small-footed myotis, spotted bat, and the long-eared myotis have been observed on the DOE's NTS and are likely to occur on NTTR.

3.11 CULTURAL RESOURCES

Cultural resources analyzed in this section include sites, buildings, structures, or objects which are over 50 years old. Locations with importance to a group (i.e., traditional cultural properties [TCPs]) are also discussed. Resources and locations are recorded and evaluated by archaeologists and historians; those that meet one or more criteria in 36 CFR 60.4 are determined by the Air Force in consultation with the SHPO as eligible for nomination to the *National Register of Historic Places*. If the federal action has potential for adverse effects to eligible sites, the Air Force makes a determination of adverse effect; if no eligible properties are present, the determination is either no historic properties present or no adverse affects. An Area of Potential Effect includes eligible properties that could be indirectly affected by the action, such as a shelter cave that is visible to construction personnel who have the potential to visit and remove artifacts. The Area of Potential Effect for this action is defined as the region of influence, or affected environment.

Section 106 of the *National Historic Preservation Act of 1966* (NHPA) requires that federal agencies take into account the effects of their undertakings on historic properties which are locations, features, and objects older than 50 years and determined eligible for nomination to the *National Register of Historic Places* (or National Register). Section 110 (a)(2) of the NHPA requires that federal agencies establish a preservation program, in consultation with the Secretary of the Interior, for the identification, evaluation, and nomination to the *National Register*. Methods for inventory and evaluation are described in Appendix I of the 2007 Integrated Cultural Resources Management Plan (ICRMP) (Air Force 2007b). Efforts to identify and evaluate cultural resource properties for this project, according to 36 CFR 800.4, were initiated in 1978 and continue to the present. Nellis AFB initiated a Native American Program in 1996 as a foundation for government-to-government consultation. Activities have included annual meetings, NTTR field trips, and participation in professional meetings. In 1999, the CGTO elected five members to a Document Review Committee (DRC). This Group interacts with and is an integral part of the Nellis AFB Native American Program. The DRC reads and comments on a number of different types of documents which include cultural resources reports and environmental assessments prior to SHPO reviews.

The affected environment is Nellis AFB-managed land in Nevada that includes the NTTR and Nellis AFB's property in Las Vegas Valley. Section 112 of the NHPA mandates that federal agencies maintain permanent records produced through historical and archaeological research in appropriate databases, access to which shall be granted to potential users who meet the qualifications established by the Secretary of the Interior. The cultural resources inventory, identification, and evaluation process on Nellis AFB lands developed from minimal recordation without evaluation into a system that emphasizes a substantially higher demand for thoroughness. For example, an estimated 60 percent of site forms composed prior to 1994 lack justifications using research questions and National Register criteria to recommend eligibility. Forty percent of the records prior to 1982 lack sufficient information to meet current Nellis AFB standards.

Archival searches yielded information on the dates, characteristics, intensity of cultural resource surveys, locations of cultural resources, and assessed effects upon sites. *Federal Register* volumes were reviewed to verify eligible or listed National Register properties. Records for inventories on Nellis AFB and NTTR are maintained in an Excel program in the 99 Environmental Management Division files. Results of surveys on the DNWR's co-managed portion of the South Range are also on file at Nellis AFB.

All inventory acreage was inspected at a maximum of 100-foot transect intervals. Sampling utilized 100-foot intervals in blocks. Isolated artifacts were recorded on site forms until 1996. They were not considered sites in the ICRMP, thus not included in the total calculations in this document. Most inventory acreage has been obtained from sampling strategies in zones, not projected for impacts, to characterize the sensitivity of the land. Thus, inventoried acreage totals do not imply the surveys were subjected to complete site evaluation or consultation on determinations.

3.11.1 Nellis AFB

All of Nellis AFB, which includes Area I, Area II, and Area III, has been surveyed for archaeological resources and all sites evaluated. One National Register-eligible site, a quarry, is located on the base in Area II. All other sites were determined through SHPO consultation (letter dated April 12, 2001) to be ineligible for nomination. The Nevada SHPO has concurred with these determinations (Nevada SHPO 2004).

The areas north and east of Nellis AFB are currently open range, somewhat mountainous, and managed by the BLM. Areas to the south and west are developed. The undeveloped areas are considered to be low in potential for containing prehistoric resources since they lack water, are covered in sand dunes, and would have possessed few food resources in the past. Approximately 10 percent of this area, which is managed by the BLM, has been surveyed. A total of 20 prehistoric sites and 9 historic sites have been recorded (Air Force 2010a).

In 1988, an inventory and evaluation of World War II structures was completed for Area I of Nellis AFB. In a letter dated 14 June 1991, the Nevada SHPO reviewed the evaluation and concurred that no eligible structures were present, the office requested further review of the McCarran Field Air Terminal built in 1942. An informal review of the building was conducted in 1997 by a SHPO architectural historian. The SHPO historian determined the alterations to the building had compromised its physical integrity. Thus, no World War II structures on Nellis AFB are considered to be eligible to the National Register (Air Force 2001b).

In 2004, 336 Wherry houses constructed from 1950 to 1957 and 113 Capehart structures built on Nellis AFB in 1960 were proposed for destruction. Field research was conducted and it was argued that the buildings lacked physical integrity for further eligibility consideration. The SHPO concurred with the

recommendation (personal communication, Myhrer 2006). Following this review, Nellis AFB determined an updated historic building inventory for the Nellis AFB Las Vegas Valley properties and Creech AFB was necessary.

According to 36 CFR 60.4 (g), special properties may have achieved significance within the last 50 years due to exceptional importance within the appropriate local, state, or national historic context. Because the Cold War had impacts for the history of the nation, the DoD Legacy Resource Management Program and the Air Force Federal Preservation Officer determined it necessary to evaluate Cold War facilities to comply with Section 110. To ensure compliance with Section 106, an action memo was sent in 1992 to the Air Force Civil Engineer stating that the SHPO would be consulted prior to any actions with potential to affect Cold War facilities.

Nine structures, constructed between 1951 and 1971, were inventoried in 2006 (Air Force 2006c). These structures were identified in an on-going survey and evaluation of 172 buildings from the Cold War era on Nellis AFB. Due to their proposed demolition (as part of the Base Realignment and Infrastructure actions occurring on the base) a separate report on eligibility recommendations for Nevada SHPO Section 106 review was done by Nellis AFB. These nine structures include seven buildings that are older than 50 years (Buildings 67, 250, 258, 265, 839, 841, and 941) and two that are less than 50 years old (Buildings 264 and 413). Consultation with SHPO on the ineligibility of the nine structures was completed in December 2006. The Nevada SHPO concurred that the nine structures were not eligible to the NRHP (Appendix A provides a copy of this concurrence letter).

No traditional cultural properties, sacred areas, or traditional use areas have been identified on Nellis AFB.

3.11.2 Nevada Test and Training Range

Archaeological Resources

Approximately 5,000 archaeological resources have been recorded on lands under the NTTR airspace. These consist of an estimated 600 within Clark County, 2,400 within Lincoln County, and 2,000 within Nye County. Within Clark County, only one of these archaeological sites is listed on the National Register. In Lincoln County, two archaeological districts and one archaeological site/complex are listed on the National Register. In Nye County, one National Register-listed site lies under the airspace (National Register 2011). Most of the recorded archaeological sites have not been evaluated for National Register eligibility.

Historic archaeological sites associated with mining and ranching are found throughout NTTR. Seventy-six historic resources have been identified and recorded including ranching complexes and mining towns

(Air Force 2010a). As mining and ranching were practiced throughout NTTR, it is reasonable to expect that similar historic sites would be found elsewhere. Other historic resources on NTTR include transportation and communications routes. A segment of the Las Vegas-Tonopah Railroad, built and used from 1907 to 1916, crosses the southern boundary of Creech AFB.

Approximately 6 percent of the withdrawn areas within NTTR have been surveyed for archaeological resources. The Tonopah Test Range, Creech AFB, and the Tolicha Peak compounds were completely inventoried with no eligible sites found (Air Force 2007b). During inventories in 1997 to 2004, over 2,700 sites were recorded within the withdrawn area of NTTR. Forty-seven sites are considered to be eligible for the National Register and 2,507 sites are unevaluated. Based on current evaluation standards, many unevaluated sites, especially those on playas and at lower elevations (below 5,000 feet), probably would not be recommended eligible to the National Register (Myhrer 2003). A total of 223 have been evaluated and are considered to be not eligible to the National Register.

Architectural Resources

Hundreds of structures, features, and a few towns associated with the mining and ranching history of Nevada are found throughout NTTR. Numerous mines and 15 mining districts, many with associated campsites, were opened in what is now the withdrawn area of NTTR during the late 19th and early 20th centuries. Seven structures under the NTTR airspace in Lincoln and Clark Counties are listed on the National Register. More than 100 historic ghost towns, most containing architectural features, are located under the MOAs and restricted air space. Town sites include Hiko, Delamar, Helene, Barclay, Tempiute, Crystal Springs, Pioche, Bullionville, and Reveille (United States Ghost Towns 2006). The towns were associated with mining and railroad operations in the area. Some are still inhabited while others are abandoned and in various states of decay. No World War II and Cold War-era National Register structures have been identified within NTTR or under associated airspace.

Traditional Cultural Properties

TCPs located on NTTR may include traditionally used plants and animals, trails, and certain geographic areas. Types of resources that have been specifically identified in recent studies include rock art sites; power rocks and locations; medicine areas; landscape features such as specific peaks or ranges, hot springs, meadows, valleys, and caves; traditional-use plants (AIWS 1997); traditional-use animals such as hawks, eagles, insects, mountain lions, and deer; burial sites; gathering places for rabbit drives, dances, and ceremonies; traditional landscapes; and lithic raw material. Through Nellis AFB's Native American Program and ethnographic studies, ceremonial and sacred sites within NTTR have been identified and protected. Since 1997, Nellis AFB has been in the process of utilizing professional archaeologists with Native Americans to systematically characterize its seven mountain ranges. Any TCP designation will be initiated in combined efforts by Nellis AFB with the tribes. Nellis AFB is currently in the process with

Native Americans to characterize its fifth mountain range. In 2005, the first pine nut harvest in 65 years was conducted on NTTR as part of the Native American Program evaluation process. Consultation through the Native American Program early in the planning process ensures that traditional cultural properties would not be affected by proposed projects. No specific traditional resource issues with regard to the F-35 beddown arose during scoping.

3.12 HAZARDOUS MATERIALS AND WASTE

Hazardous materials are chemical substances that pose a substantial hazard to human health or the environment. Hazardous materials include hazardous substances, extremely hazardous substances, hazardous chemicals, and toxic chemicals. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. The Resource Conservation and Recovery Act (RCRA) (42 USC 6903[5]) defines a hazardous waste as a solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous substances are defined and regulated under the laws administered by USEPA, Occupational Safety and Health Administration (OSHA), and U.S. Department of Transportation (DOT). Each of these agencies incorporates hazardous substance terminology in accordance with its unique Congressional mandate: OSHA regulations categorize substances in terms of their impacts on employee and workplace health and safety; DOT regulations categorize substances in terms of their safety in transportation; and USEPA regulations categorize substances in terms of protection of the environment and the public health.

With regard to environmental impacts, hazardous substances are regulated under several federal programs administered by the USEPA, including Comprehensive Environmental Response Compensations, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act, Toxic Substances Control Act (TSCA), and RCRA. DoD installations are required to comply with these laws along with other applicable federal, state, and DoD regulations, as well as with relevant EOs.

In regulations promulgated under RCRA, the USEPA defines hazardous waste as a solid waste that is not excluded from regulation as a hazardous waste under 40 CFR § 261.4(b) and exhibits any of the characteristics (ignitability, corrosivity, reactivity, toxicity) described in 40 CFR § 261; or is listed in 40 CFR § 261 Subpart D; or is a mixture containing one or more listed hazardous wastes. Hazardous wastes may take the form of solid, liquid, contained gaseous, semi-solid wastes (e.g., sludges), or any combination of wastes that pose a substantial present or potential hazard to human health or the environment and have been discarded or abandoned. For the purposes of this EIS, hazardous wastes include solid wastes that are regulated as hazardous based on either direct listing by USEPA or characteristics (ignitability, reactivity, corrosivity, and toxicity), as well as those contaminants present in environmental media (e.g., soil or groundwater).

Military munitions used for their intended purposes on ranges or collected for further evaluation and recycling are not considered waste per the Military Munitions Rule (40 CFR § 266.202). The Military

Munitions Rule amended portions of RCRA (40 CFR §§ 260 through 170) and defines when conventional and chemical military munitions become solid waste potentially subject to RCRA. Specifically, the use of flares is ongoing at most bases analyzed in this EIS and would continue with the implementation of the proposed action. Since the munition would be used for its intended training purpose and most flare residual material or debris does not constitute a hazardous waste, any residual material that falls to the ground would not be considered a solid waste and thus not a hazardous waste.

At Nellis AFB, day-to-day operational activities require the use and storage of a variety of hazardous materials (HAZMAT) and wastes, including flammable and combustible liquids, acids, corrosives, caustics, compressed gases, solvents, paints, paint thinners, and various other petroleum, oils, and lubricants (POLs). The base has established procedures for purchase, receiving, use, reuse, recycle, and final disposal of hazardous materials through application of the Hazardous Materials Management Program, proscribed in Air Force Instruction (AFI) 32-7086 and Waste Management Program (AFI 32-7042) (Air Force 2009d and 2010b).

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, requires the promotion of pollution prevention and elimination of waste by reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed. Additionally, 95 percent of all new contracts require the use of products that are non-toxic or less-toxic.

The F-35 Program includes an Air System Lifecycle Plan for each aircraft that also focuses on hazardous materials reduction and elimination initiatives (Fetter 2008). In the design phase for the F-35, Lockheed Martin Aeronautics has substituted materials and processes where a more environmentally preferable alternative is available. The F-35 program continues to seek material substitutions that focus on sustainability and decreasing the lifecycle expense of materials and materials handling for the aircraft.

Some of the materials substitutions that have been implemented in the development of the F-35 include reducing or eliminating the use of many heavy metals and other environmentally sensitive materials that were expensive to handle and dispose (Fetter 2008; personal communication, Luker 2010). The F-35 has implemented the use of titanium or stainless steel fasteners instead of traditional, cadmium-plated screws and rivets. A new Integrated Power Package has replaced a dangerous and toxic hydrazine system that is used in F-16 legacy aircraft to restart stalled engines at altitude. The landing gear and other high wear surfaces of traditional aircraft was chrome-plated, an expensive, high-maintenance, slow, and environmentally risky process. The F-35 instead uses a high velocity, oxygenated fuel technology that uses a powder to coat the parts, improving the function and extending the lifespan of F-35 actuators, wear surfaces, and landing gear – without the use of chrome plating. Primers have been developed that do not require the use of traditional cadmium and hexavalent chromium-based material. Copper-Berylluim bushings were formerly used in high-load actuators, such as the tail and landing gear, and new materials are being designed and substituted where feasible. Finally, a new detection device will alert maintenance

teams to corrosion issues in the aircraft, and thereby, reduce stripping and repainting of the aircraft to an as-needed procedure.

Another potential difference between the legacy fighter aircraft and the F-35A is with respect to the fuel loading capabilities. For example, the F-35A internal fuel load is roughly twice that of an F-16, with no significant fuel efficiency decrease over the older model (Headquarters ACC/A5BA 2010; Global Security 2006).

Toxic Substances

The promulgation of TSCA (40 CFR §§ 700-766) represented an effort by the federal government to address those chemical substances and mixtures for which it was recognized that the manufacture, processing, distribution, use, or disposal may present unreasonable risk of personal injury or health of the environment, and to effectively regulate these substances and mixtures in interstate commerce. The TSCA Chemical Substances Inventory lists information on more than 62,000 chemicals and substances. Toxic chemical substances regulated by USEPA under TSCA include asbestos and lead, which for the purposes of this EIS, are evaluated in the most common forms found in buildings, namely asbestos-containing materials (ACM) and lead-based paint (LBP). TSCA also establishes management obligations for the cleanup of polychlorinated biphenyls (PCBs).

ACMs have been classified as a hazardous air pollutant by the USEPA in accordance with Section 112 of the CAA. Surveys would be conducted for ACMs, as required by 40 CFR § 61.145, during the design phase of the project and prior to demolition or renovation of any structure. Any located ACM would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment.

LBP may also be present in buildings or other facilities that would be modified or demolished as part of the proposed action. Similar to ACMs, surveys would be conducted on structures to be modified or demolished for LBP during the design phase of the project and prior to structure demolition or renovation. LBP sampling would be conducted on the structures to be removed and analyzed in accordance with USEPA approved Toxicity Characteristic Leaching Procedure methodology. Based on this federal testing methodology, the paint would be considered hazardous if lead is detected at concentrations greater than 5 micrograms per liter. If LBP were detected at hazardous concentrations, these materials would be removed. LBP would be characterized, managed, transported, and disposed according to applicable state and federal requirements for protecting human health and safety and the environment.

Beginning in the 1920s, PCBs had many common household uses, including applications in electrical transformers, as coolants in refrigeration machinery, and in oil and hydraulic fluids. PCBs are toxic and have been classified as a persistent organic pollutant, acting as carcinogens that do not break down easily

in the environment. Thus, the manufacture and use of PCBs in the U.S. was banned by Congress in 1979 and cleanup actions are regulated through TSCA.

Contaminated Sites

Potential hazardous waste contamination areas are being investigated as part of the Defense Environmental Restoration Program (DERP). DoD developed the DERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property prior to 1984. As part of DERP, DoD created the Installation Restoration Program (IRP) and the Military Munitions Response Program (MMRP). These programs were instituted to satisfy the requirements of CERCLA and RCRA for former and current hazardous waste sites.

Hazards associated with historic ranges include military waste munitions that were improperly disposed and unexploded munitions rounds. The MMRP is designed to clean up discarded military munitions, unexploded ordnance, and their chemical residues at closed historic ranges and munitions disposal sites. The MMRP is modeled after the IRP and is implemented using the process developed for cleanup under CERCLA legislation. This program also addresses the unique explosive safety hazards associated with munitions and explosives and human health risks posed by munition constituents at locations not designated as operational ranges.

There are currently nine active Environmental Restoration Program (ERP) sites on Nellis AFB (Air Force 2004b). Four of these sites (SS-28, ST-44, SS-45, and SS-46) could be impacted by the proposed action construction (Figure 3.12-1). Site SS-28 is an historic fuel spill located near Building 941 and remedial action operations are underway for extraction of product/ground water and long-term monitoring to ensure CERCLA compliance. ST-44 is a fuel leak from two underground storage tanks (USTs) at the AGE service island. Remedial action operations have continued with the injection of potassium permanganate to further degrade onsite contamination. Site SS-45 is a fuel spill near the Base Exchange Car Care Center. Remedial action operations have continued with the injection of hydrogen peroxide to further degrade the contamination. Site SS-46 is a trichloroethylene (TCE) spill with remediation continuing with the injection of potassium permanganate to further degrade contamination onsite.

An ERP waiver would be required if proposed construction should occur above ERP groundwater plumes. If proposed construction should occur on an ERP site, the remediation would need to be completed prior to initiation of the project.

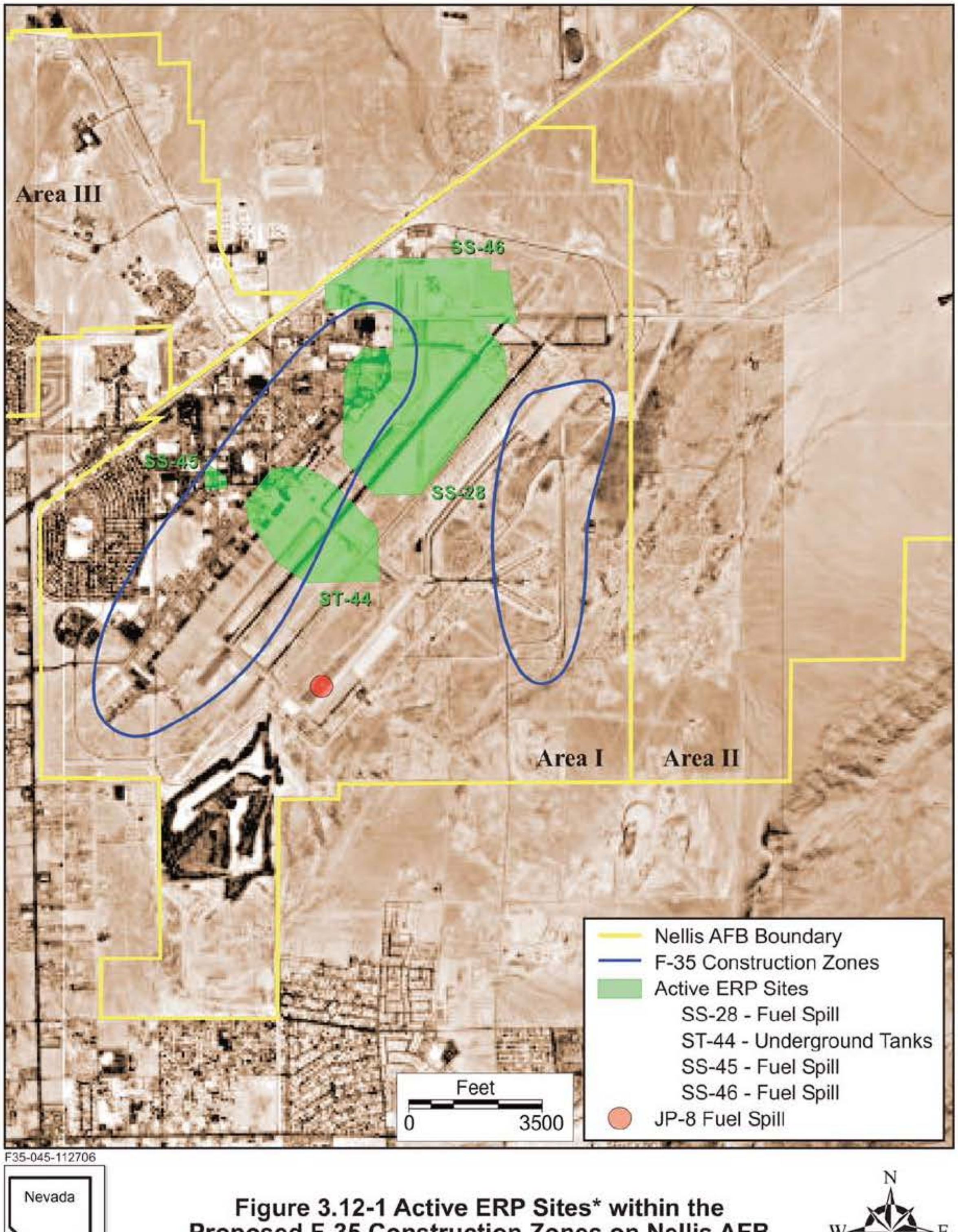


Figure 3.12-1 Active ERP Sites* within the Proposed F-35 Construction Zones on Nellis AFB

*Eastside Fighter Revetment JP-8 Fuel Spill, Not an ERP Site

Although not an ERP site, an active but remediated JP-8 jet fuel spill site lies near the east side of the fighter revetments (see Figure 3.12-1). The release of JP-8 into the soil and groundwater occurred from leaking underground fuel supply pipes in 1995 and 1997; all leaks were repaired. Remediation involves groundwater monitoring and continued operation of the soil vapor extraction system to mitigate the residual hydrocarbons in the affected soil.

The affected areas for potential impacts related to HAZMAT and waste consists of Nellis AFB, with an emphasis on aircraft maintenance and munitions handling areas. Since the proposed F-35 FDE program and WS aircraft operations within NTTR would not generate or require disposal of hazardous wastes, a discussion of hazardous wastes within NTTR and under associated airspace is not provided.

3.12.1 Hazardous Materials and Hazardous Waste Generation

Activities at Nellis AFB require the use and storage of a variety of hazardous materials that include flammable and combustible liquids, acids, corrosives, caustics, anti-icing chemicals, compressed gases, solvents, paints, paint thinners, and pesticides.

Nellis AFB uses a hazardous material pharmacy pollution prevention system to manage hazardous materials. This process provides centralized management of the procurement, handling, storage, and issuing of hazardous materials, as well as the turn-in, recovery, reuse, recycling, and disposal of hazardous wastes. The pharmacy approval process also includes review and approval by Air Force personnel. In addition, the base has a Facilities Response Plan, (Air Force 2002b), which includes site specific contingency plans.

The Nellis AFB Hazardous Waste Management Plan (Air Force 2002c) provides guidance and procedures for proper management of RCRA and non-RCRA hazardous waste generated on the base to ensure compliance with applicable regulations. Base management plans and DoD directives also serve to implement these laws and regulations and include hazardous material management plans, spill prevention and contingency plans, and pollution prevention plans that are regularly updated to reflect any changes in the base mission.

Nellis AFB generated approximately 191,000 pounds of RCRA hazardous waste in 2004 (personal communication, Wingate 2005), and is therefore considered a large quantity generator by the EPA. Hazardous waste at Nellis AFB is accumulated at an approved 90-day storage area, or at satellite accumulation points. Approximately 100 satellite accumulation points and one 90-day storage area are operated at Nellis AFB (Air Force 2002c). All accumulation points must comply with requirements for siting, physical construction, operation, marking, labeling, and each inspection and must maintain a container inspection log. Generators of hazardous wastes are responsible for properly segregating,

storing, characterizing, labeling, marking, and packaging all hazardous waste for disposal as prescribed by the Hazardous Materials Table in 49 CFR Part 172.101.

A variety of activities on base, including aircraft maintenance and support, civil engineering, and printing operations, have been identified as primary contributors to hazardous waste streams. Numerous other shops add to hazardous waste streams, including AGE, aircraft structural maintenance, fuels management, non-destructive inspection, munitions and armament shops, in-squadron maintenance, the wheel and tire shop, and others (e.g., avionics, egress systems, electrical, metals, pneudraulics, hydraulics, radio, jet engine, and structural maintenance). The greatest volumes of hazardous waste are generated from aircraft support functions. Routine activities conducted on the flightline generate paints containing lead-mercury-chromium, hazardous waste containers, and contaminated rags. Wastes derived from maintenance activities include petroleum, oils, and lubricants, paints and paint-related wastes such as thinners and strippers, batteries, contaminated spill absorbent, adhesives, sealers, solvents, fuel filters, photochemicals, ignitable wastes, and metals. Basic processes and waste handling procedures for general aircraft maintenance activities are identified in the Nellis AFB Hazardous Waste Management Plan (Air Force 2002c).

Nellis AFB has a proactive program to identify asbestos and lead in all structures in order to reduce potential hazards to occupant, workers, and the environment during future construction projects. Many buildings on base date from the 1940s through the 1980s; asbestos-containing materials have been identified in many of these facilities. Renovation or demolition of on-base structures is reviewed by Civil Engineering personnel to ensure appropriate measures are taken to reduce potential exposure to, and release of, friable asbestos. Non-friable asbestos is not considered a hazardous material until it is removed or disturbed. The Nellis AFB Asbestos Management and Operations Plan (Air Force 2003a) and Nellis AFB Lead-Based Paint Management Plan (Air Force 2003c) provide guidance on the proper handling and disposal of ACM and LBP.

4.0 ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 presents the environmental consequences of the proposed beddown of the F-35 FDE program and WS at Nellis AFB. It addresses impacts for each of the 11 resources in Chapter 3. To identify the potential environmental consequences, this section (Chapter 4) overlays the components of the proposed action (Chapter 2) onto the affected environment (Chapter 3). A comprehensive matrix comparing the proposed action and the no-action alternative by resource and the potential impacts is provided in Table 2-17. Cumulative effects of the F-35 beddown with other past, present, and foreseeable future actions are presented in Chapter 5.

The Air Force performed the impact analysis according to the nature of the proposed activity (construction, demolition, and/or aircraft operations) and the potential impact these activities would have upon the resource. Resource impacts at the base were evaluated particularly between the years 2011 through 2016, when both construction and aircraft operations overlap. By 2016, when construction is completed, only aircraft operations would be associated with the proposed action. The year 2020, when the beddown would be completed, was chosen to evaluate impacts since it represents the peak year in which all 36 aircraft would be based at Nellis AFB and would represent the most conservative (i.e., the greatest) number of aircraft operations that would occur at the base and in NTTR airspace. Table 4.1-1 presents this analysis approach as it relates to the type of impact, the year(s) associated with the impact, and the resource category.

Table 4.1-1 Impact Analysis Approach by Resource for Nellis AFB

Resource Category	*Construction and Aircraft Operations (2011-2016)*	*Aircraft Operations (2020)*
Airspace Management and Aircraft Operations		✓
Noise	✓	✓
Air Quality	✓	✓
Safety		✓
Land Use and Recreation		✓
Socioeconomics and Infrastructure	✓	✓
Environmental Justice and Protection of Children	✓	✓
Soils and Water	✓	
Biological Resources	✓	✓
Cultural Resources	✓	✓
Hazardous Materials and Wastes	✓	✓

4.2 AIRSPACE AND AIRCRAFT OPERATIONS

The assessment of airspace use and management discusses how the proposed action and no-action alternatives would affect air traffic within the airspace of Nellis AFB and NTTR. Since no modifications or additions are proposed for the current airspace structure in support of this proposed action, the impact analysis focuses on changes in airspace use that would result from the addition of nearly 17,000 annual F-35 airfield operations by the year 2020. These sorties would increase current levels by about 21 percent without consideration of potential future budget constraints, changes in the number of exercises/exercise participants, fuel costs, and other factors that affect yearly cumulative sortie totals. Historic records indicate that total annual NTTR use has ranged between 200,000 and 300,000 sortie-operations (where a sortie-operation is counted for each NTTR subdivision through which an aircraft operates during the course of a mission sortie). Refer to Appendix B for more detailed information on historic NTTR sortie use.

While the F-35s will eventually replace the A-10, the current model more closely aligns with the F-16 and can be expected to operate within the same NTTR airspace subdivisions and perform the same type of combat missions. The F-35 will emphasize air-to-ground combat missions, but it would predominantly fulfill an air-to-air combat role. The majority of F-35 flight operations would occur during the day at subsonic speeds and altitudes at or above 5,000 feet AGL. Historic range utilization records indicate that about 65 percent of the F-16 annual mission sorties are conducted within restricted areas over air-to-ground targets. The other 35 percent occur in the MOAs where air-to-air training is emphasized. The F-35 would generally follow this pattern. The average duration of an F-35 mission would be about 1.5 hours.

4.2.1 Proposed Action

Nellis AFB

The proposed F-35 beddown would not adversely affect the use and management of the Class B airspace surrounding Nellis AFB. This is particularly evident when comparing operational increases that could result from the proposed action with historic operational levels. The proposed F-35 annual airfield operations are projected to be approximately 17,000. In 2020, with all 36 F-35 aircraft at the base, the added activity would raise total airfield operations by 20 percent. When taken in the context of the large historic fluctuations over the years, the overall impact on operations would be minor. This increase does not consider reductions or fluctuations that may occur over the years as a result of budget impacts, aircraft realignments, and changes in the number, composition, and duration of the different exercises. The proposed beddown would not require any modification to the current terminal airspace structure or operational procedures.

The F-35 would not require any changes to the departure and arrival route structures discussed in section 3.2.1. These routes were established on the basis of terrain and obstacle clearance, civil air traffic routes and available airspace, navigational aid coverage, noise abatement, and operational characteristics of aircraft based at Nellis AFB. There would be no impacts to Nellis AFB airfield and airspace structure.

Nevada Test and Training Range

Proposed F-35 activities would not alter the current structure or management of NTTR restricted areas and MOAs. While varying range operations through the years have resulted in cumulative total annual use ranging between 200,000 and 300,000 sortie-operations, the addition of F-35 aircraft would increase total sortie-operations by 51,840 annually. This represents a 26 percent increase under the low-use scenario and a 17 percent increase of the former maximum (300,000). Neither of these increases of sortie-operations (251,840 to 351,840) would tax the capability of NTTR to support this uptake for management or use. The F-35 would fly mission profiles similar to those flown by F-16s. Most F-35 training activities would occur throughout the restricted areas for air-to-ground training and the Desert and Reveille MOAs would continue to be used for air-to-air combat training and staging for range battlefield operations.

The F-35 would not require any changes to the airspace currently approved for supersonic operations. Current forecasts estimate the F-35 would fly supersonic approximately 3.5 percent of the time, increasing overall NTTR supersonic activity by less than 1 percent. It is anticipated that the F-35 would not fly supersonic as often as the F-16 because of the increased close-air support mission.

Under the proposed action, the F-35 would use MTRs IR-286 and VR-222 on a limited basis and their use by all aircraft would continue at a rate of less than one per day. The F-35's infrequent use would not impact use of MTRs by other aircraft, nor would it impact civil or commercial air traffic that pass through the regional airspace.

In summary, there would be no impacts to NTTR airspace management if the proposed action were implemented. Use would increase, but would not adversely impact management or conflict with existing use within NTTR.

Civil and Commercial Aviation Airspace Use

The proposed action would have no impact on civil and commercial aviation airspace use because the F-35 would be operating within the same flight parameters currently used for Nellis AFB terminal and NTTR airspace. As discussed in section 3.2.2, civil air traffic operations at the local airports, on the federal airways and jet routes, and above those highways commonly used as visual references by VFR aircraft are sufficiently clear of and unaffected by Nellis AFB and NTTR operations. These operations

and the F-35 beddown would not affect future commercial and general aviation growth in Nevada because they will continue to follow the same flight parameters. Ongoing interaction between Nellis AFB and state and federal agencies will help ensure continued compatibility of military and commercial/civil aviation in the affected environment of Nellis AFB and NTTR airspace.

4.2.2 No-Action Alternative

Under this alternative, airspace use in the Nellis AFB terminal airspace and arrival and departure routes would remain similar to that described in section 3.2.1. The total number of operations (takeoffs and landings) at Nellis AFB is expected to remain generally the same as recent average levels (about 85,000) since no significant changes are expected in the foreseeable future in Air Force Warfare Center test and training flight mission activities. The no-action alternative would not change the configuration or management of Class B airspace.

Scheduling and use of the four NTTR restricted areas and two MOAs would continue as at present in order to support bombing, gunnery, and electronic warfare training, Red Flag exercises, WS mission employment exercises, and other test and training activities. No changes to the MOA boundaries or their overlying ATCAAs are anticipated under the no-action alternative.

The no-action alternative would have no effect on the airspace and altitudes authorized for supersonic flight within NTTR or on the number and frequency of supersonic operations flown during air-to-air training or other operations where rapid evasion of a simulated threat is necessary. Supersonic flight would continue at the baseline rate discussed previously.

Nellis AFB and NTTR are situated in an area that has had little effect on commercial and general aviation in the region. This is due primarily to the near direct routing provided by federal airways and jet routes for IFR traffic and the visual routes commonly flown by VFR traffic between most airports through this region. No changes are currently planned for the airway/jet route structure surrounding NTTR. Although commercial and general aviation are expected to increase by 54 and 17 percent, respectively, by 2015 (NDOT 2005), such increases would not be affected by Nellis AFB and NTTR operations, which are expected to remain at current levels. The interaction of Nellis AFB operations and airspace management with state and federal agencies provides avenues for discussing any airspace matters.

4.3 NOISE

Noise around Nellis AFB and within NTTR would be affected by beddown of the F-35. By 2020, the number of airfield operations around Nellis AFB would increase to accommodate the additional F-35 aircraft. For this reason, noise was measured under this peak scenario. The airfield analysis uses the most recent noise projections as presented in Figure 3.3-1 (Air Force 2004c).

This analysis quantified noise impacts around Nellis AFB by comparing baseline and projected DNL contours. Impact analysis requires identification of affected areas and land uses. According to the Federal Interagency Committee on Urban Noise (1980), noise exposure greater than 65 dB DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas. This section evaluates the noise generated from the proposed action and its potential effects to the noise environ. Section 4.6 (Land Use) evaluates the effects of noise on surrounding land ownership or land status, general land use patterns, land management plans, and special use areas.

Data used to calculate F-35 noise levels were obtained from the JSF Program Office in charge of design and development of the F-35. Engine time in modes, taxi time, approach, and departure parameters from the test F-35A were used. Karnes2 flight profiles were used to identify engine power settings, airspeed, altitude and times in mode for each operational profile. If further revised operational data becomes available and approved for release in Air Force NEPA and CAA General Conformity documentation generally, the Air Force will re-analyze noise and air quality impacts analysis for the proposed action to determine if either supplemental NEPA analysis, or a new CAA General Conformity Determination, is required under the circumstances.

As noted in section 4.2, the F-35 will operate within the same NTTR airspace and perform the same type of combat missions as the F-16 and some of the combat missions as the A-10. The projected total activity on the range would increase from the historic range of 200,000 to 300,000 sortie-operations described in section 4.2 to 251,840 to 351,840 sortie-operations. Any differences in noise would be associated with this increase and with the change in aircraft-type mix as the F-35 is introduced. The analysis accounts for both subsonic noise and sonic booms from supersonic flight. Subsonic noise in the NTTR is quantified by decibels (dB) in DNL. The cumulative sonic boom environment is quantified by CDNL and by the number of booms per month that would be heard at a typical point in each airspace subdivision.

4.3.1 Proposed Action

Nellis AFB

Projected changes to noise levels in the vicinity of Nellis AFB were calculated by using the full complement of 36 aircraft (i.e., 17,280 airfield operations) that would occur in 2020, identifying the flight tracks the F-35 would use, the time in mode for the various airfield operations (provided by the F-35 Joint Program Office), and the day versus night split for operations. The resulting noise contours are presented in Figure 4.3-1. By comparing these contours to the baseline noise environment, and by overlaying the contour plot on a map of Nellis AFB and vicinity, the degree of change and extent of potential noise effects were identified. Table 4.3-1 presents a comparison of total acreage affected by baseline and projected 2020 noise contours with the percent change from baseline conditions in the total land exposed under each noise contour band.

Table 4.3-1 Projected F-35 Noise Exposure (dB DNL) around Nellis AFB (in acres)

	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Total Acreage*
Projected Acres	13,991	6,259	2,804	1,268	1,338	25,660
Baseline	8,882	4,787	2,202	1,066	1,161	18,098
Change from Baseline	5,109	1,472	602	202	177	7,562
Percent Change	*58%*	*31%*	*27%*	*19%*	*15%*	*42%*

The additional F-35 operations (when compared to baseline) in 2020 represent the element with the greatest potential to affect areas subjected to noise at and around the base. By 2020, a total of 5,109 more acres would be affected by noise in the 65 to 70 DNL noise contour bands when compared to baseline conditions. There would be 2,453 more acres exposed to noise levels within the 70 dB DNL and greater contour bands. Compared to baseline conditions, there would be an increase of close to 60 percent in acres exposed to 65 to 70 dB DNL; an average of 23 percent more acres would be found within the 70 dB DNL and greater noise contour bands if the proposal were implemented. With this amount of change, it is anticipated that there could be an increase in noise complaints and levels of annoyance from residents adjacent to the base. Table 4.3-2 illustrates the relationship between subsonic and the percentage of the population highly annoyed according to the Schultz curve (Schultz 1978) (also see Appendix C). The noise generated from the airfield; however, would not be at such a level or last long enough for a person's hearing to be adversely impacted by these noise levels. While there would be a probable increase in the number of complaints and people annoyed, no significant or adverse impacts to human health or hearing would occur. As presented in section 3.3.1, noise abatement procedures are in place to reduce noise levels (Air Force 2005c) and the Air Force would continue these measures under the proposed action.

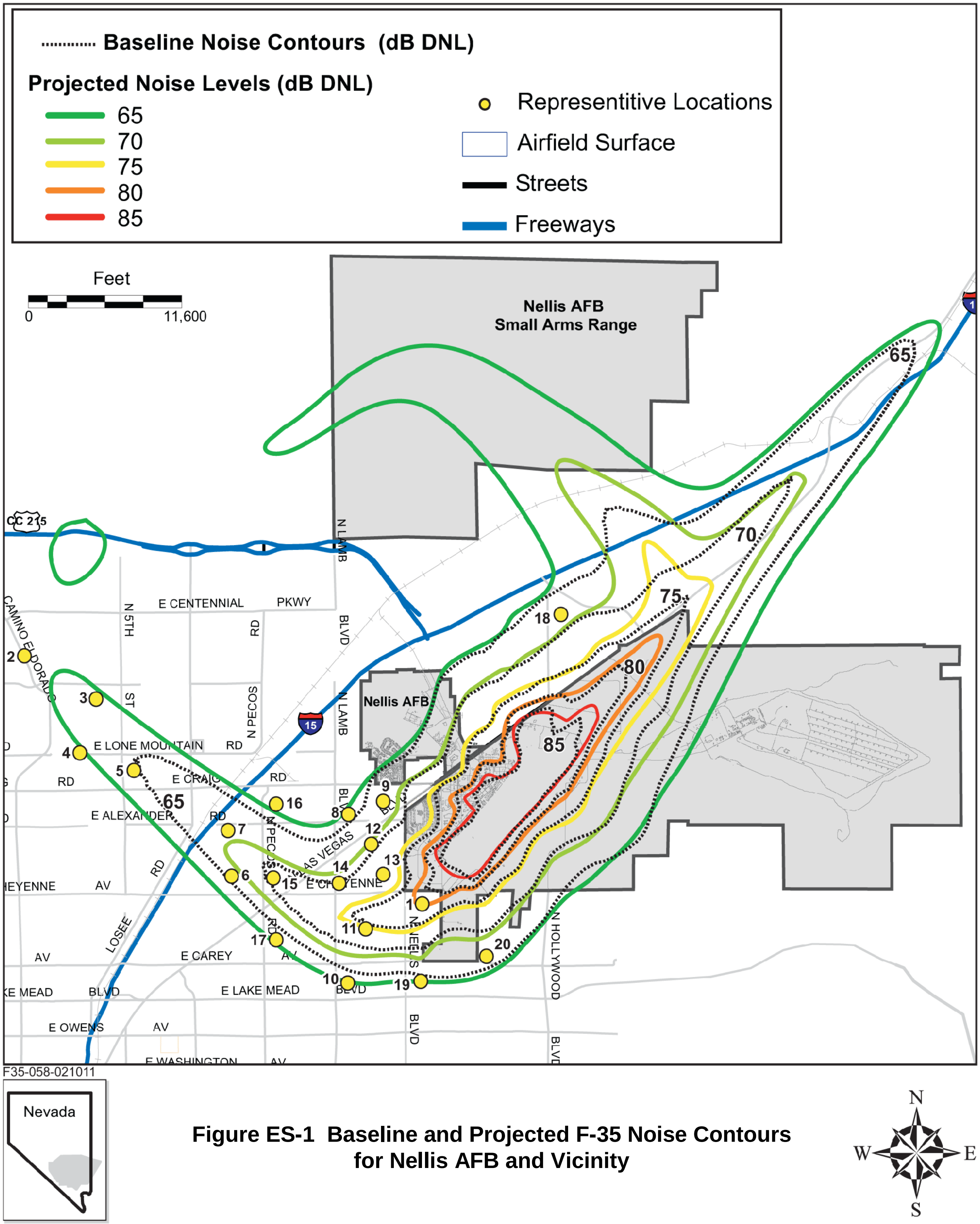


Figure ES-1 Baseline and Projected F-35 Noise Contours for Nellis AFB and Vicinity

Table 4.3-2 Relation Between Annoyance, DNL and CDNL*		
DNL	***% Highly Annoyed***	***CDNL****
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

*Applies only to NTTR airspace.

Table 4.3-3 shows a comparison between the proposed action and baseline of DNL for the 20 representative locations. As shown, all representative locations (with the exception of 11 where there would be a negligible decrease of 0.3 DNL) would experience increases in noise levels. Under the proposal, noise levels would increase between 0.5 dB DNL to 3.4 dB DNL. One location would be subject to a minor decrease.

Table 4.3-3 Comparison of Baseline and Projected Day-Night Average Sound Level at Representative Locations							
Location ID	***Baseline dB DNL***	***Projected dB DNL***	***Change from Baseline***	***Location ID***	***Baseline dB DNL***	***Projected dB DNL***	***Change from Baseline***
1	79.0	80.0	+1	11	75.3	75.0	-0.3
2	60.1	63.5	+3.4	12	69.9	70.5	+0.6
3	62.9	65.7	+2.8	13	72.3	73.0	+0.7
4	62.3	64.7	+2.4	14	70.1	71.3	+1.2
5	65.4	67.3	+1.9	15	71.0	71.9	+0.9
6	67.0	68.4	+1.4	16	62.5	64.2	+1.7
7	68.4	69.7	+1.3	17	64.1	65.8	+1.7
8	64.9	65.5	+0.6	18	68.1	68.4	+0.3
9	67.7	68.2	+0.5	19	64.5	65.8	+1.3
10	64.0	65.7	+1.7	20	67.2	67.7	+0.5

To evaluate PHL, the population exposed to DNL at and above 80 dB was identified. Under the proposed action, on-base exposure within the 80 dB and greater noise contour bands is anticipated for people residing in barracks; no off-base populations would be affected. While there would be on-base populations exposed to 80 dB DNL and greater, it is not anticipated that adverse effects would occur because this population would not be consistently exposed to these noise levels over a 40-year period.

In terms of speech interference, Table 4.3-4 lists the projected daily average number of events with both windows closed and open. Again, interference is measured by the numbers of average daily indoor daytime and evening (7:00 a.m. to 10:00 p.m.) events per hour subject to indoor maximum sound levels of at least 50 dB DNL for the representative locations. This measure also considers the effect of noise attenuation provided by buildings with the windows open (15 dB) or closed (25 dB).

Table 4.3-4 Comparison of Baseline and Projected Indoor Speech Interference at Representative Locations

Location ID	Average Daily Indoor Daytime (7:00 a.m. to 10:00 p.m.) Events per Hour*					
	Baseline		**Projected**		**Change from Baseline**	
	Windows Closed	*Windows Open*	*Windows Closed*	*Windows Open*	*Windows Closed*	*Windows Open*
1	10	14	13	17	+3	+3
2	4	6	5	8	+1	+2
3	4	6	6	9	+2	+3
4	4	6	6	9	+2	+3
5	5	6	6	9	+1	+3
6	4	7	6	10	+2	+3
7	4	7	5	10	+1	+3
8	5	10	7	12	+2	+2
9	7	11	8	13	+1	+2
10	6	11	9	13	+3	+2
11	7	11	10	14	+3	+3
12	7	12	9	15	+2	+3
13	8	12	11	15	+3	+3
14	5	10	7	13	+2	+3
15	4	8	6	11	+2	+3
16	3	7	4	9	+1	+2
17	4	7	6	9	+2	+2
18	6	12	7	14	+1	+2
19	5	10	7	13	+2	+3
20	6	11	8	13	+2	+2

*Assumes a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

When compared to baseline conditions, there would be an increase of 1 to 3 events per hour with windows closed to the 20 locations. On average, when windows are open the 20 representative locations would experience from 2 to 3 more speech interference events.

In terms of sleep disturbance, Table 4.3-5 presents the findings of potential impacts. Under the proposed action, increases in probability of sleep disturbance would range from a low 0 to 7 percent when windows are closed. When they are open, increases would range from 0 to 10 percent.

Table 4.3-5 Comparison of Baseline and Projected Sleep Disturbance at Representative Locations

Location ID	Average Nightly (10:00 p.m. to 7:00 am) Events per Hour*					
	% Baseline		**% Projected**		**% Change from Baseline**	
	Windows Closed	*Windows Open*	*Windows Closed*	*Windows Open*	*Windows Closed*	*Windows Open*
1	23	33	30	43	+7	+10
2	11	16	11	17	0	+1
3	10	15	13	19	+3	+4
4	9	14	10	14	+1	0
5	9	13	10	14	+1	+1

Table 4.3-5 Comparison of Baseline and Projected Sleep Disturbance at Representative Locations

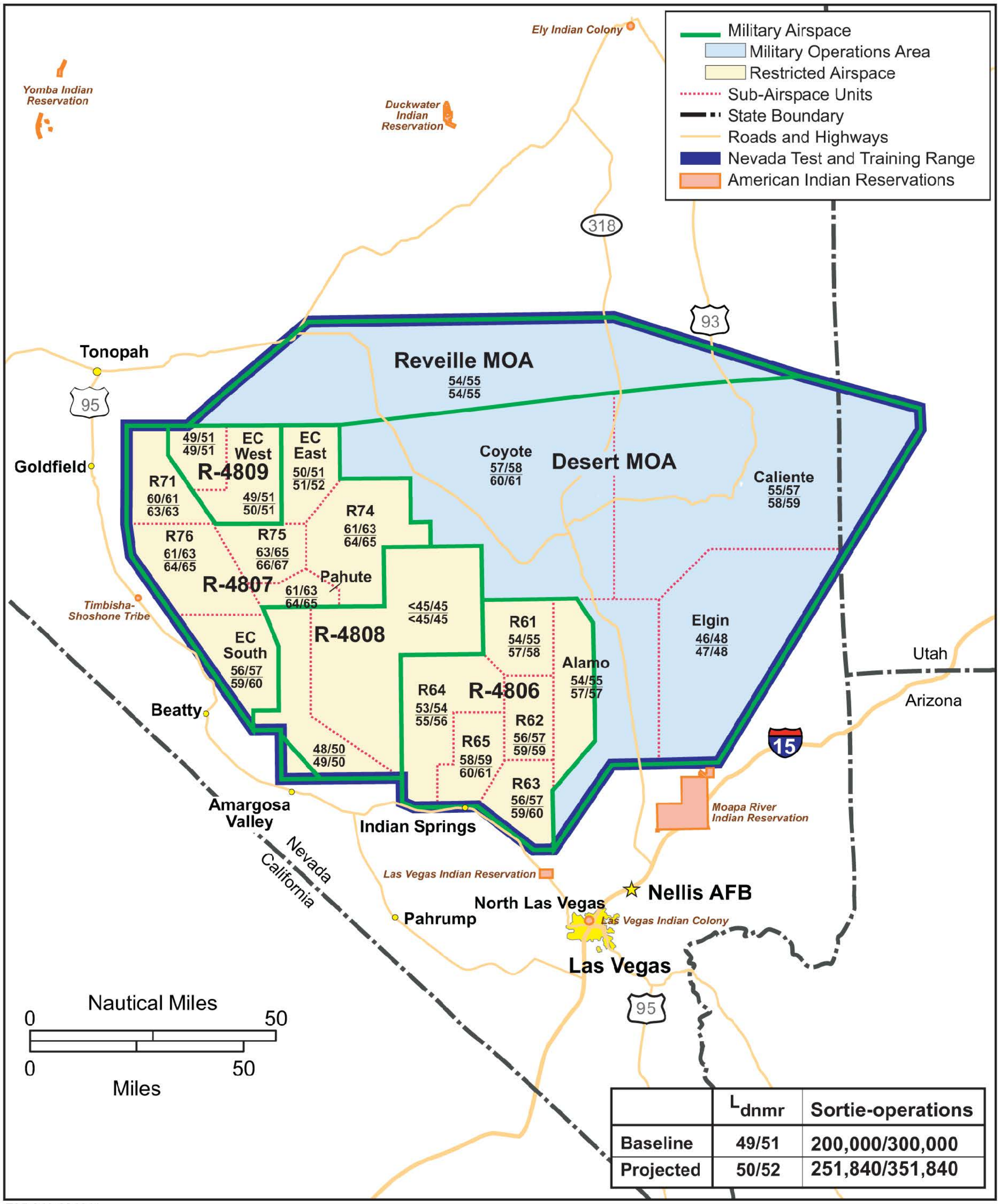
Location ID	Average Nightly (10:00 p.m. to 7:00 am) Events per Hour*					
	% Baseline		% Projected		% Change from Baseline	
	Windows Closed	*Windows Open*	*Windows Closed*	*Windows Open*	*Windows Closed*	*Windows Open*
6	10	15	12	18	+2	+3
7	10	16	12	17	+2	+1
8	17	26	18	26	+1	0
9	21	30	23	33	+2	+3
10	18	27	22	33	+4	+6
11	19	28	23	34	+4	+6
12	25	35	27	39	+2	+4
13	23	34	28	41	+5	+7
14	17	25	20	30	+3	+5
15	11	16	13	20	+2	+4
16	11	17	12	18	+1	+1
17	9	14	12	18	+3	+4
18	26	38	32	45	+6	+7
19	19	27	23	33	+4	+6
20	24	34	27	38	+3	+4

*Assumes a noise level reduction of 15 dB (windows open) and 25 dB (windows closed).

Nevada Test and Training Range

Refer to Figure 3.3-2 for subsonic SELs of several aircraft at level flight. SEL noise levels of most aircraft are highest at altitudes below 5,000 feet AGL. Given that 70 percent of F-35 flight activity would occur above 5,000 feet AGL, the proposed action would not significantly increase low-altitude overflights and accompanying noise.

Subsonic noise levels for NTTR would increase (Table 4.3-6 and Figure 4.3-2). Out of 21 airspace units, 12 would experience a 3-dB increase with 251,840 sortie-operations and 4 of the 21 units would experience a 3-dB increase with 351,840 sortie-operations. Seven of the twelve airspace units affected by a 3-dB increase consist of restricted airspace where public access is precluded. Under the 351,840 sortie-operations scenario, two of the four units subject to a 3-dB increase comprise restricted airspace.



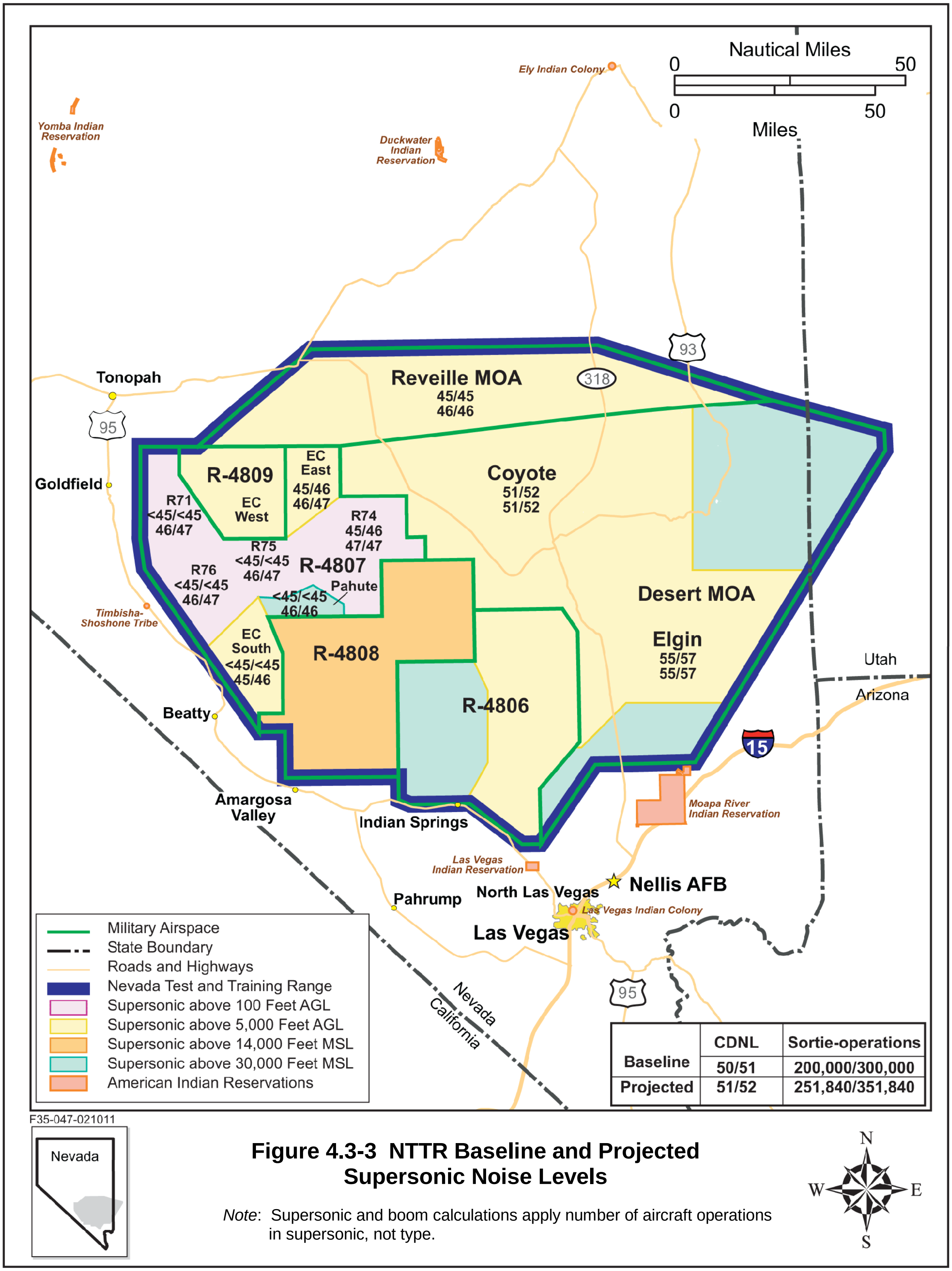
	L_{dnmr}	Sortie-operations
Baseline	49/51	200,000/300,000
Projected	50/52	251,840/351,840

Figure 4.3-2 Baseline and Projected F-35 Subsonic Noise Levels

Table 4.3-6 Baseline and Projected F-35 Subsonic Noise Levels (L_{dnmr})				
Airspace Unit	***Baseline***		***Projected***	
	200,000	*300,000*	*251,840*	*351,840*
Caliente	55	57	58	59
Coyote	57	58	60	61
Elgin	46	48	47	48
Reveille	54	55	54	55
4806				
R61	54	55	57	58
R62	56	57	59	59
R63	56	57	59	60
R64	53	54	55	56
R65	58	59	60	61
Alamo	54	55	57	57
EC South	56	57	59	60
Pahute	61	63	64	65
4807				
R71	60	61	63	63
R74	61	63	64	65
R75	63	65	66	67
R76	61	63	64	65
4809A	49	51	49	51
EC East	50	51	51	52
EC West	49	51	50	51
4808W	48	50	49	50
4808E	<45	45	<45	45

In summary, it is anticipated that there would be an increase to the number of complaints received by the base and level of annoyance experienced by communities and residents underlying the airspace units with a noise increase due to subsonic operations. Impacts to hearing and health would not be adverse.

The Air Force estimates that during air combat maneuvering, the F-35 would fly supersonic approximately 3.5 percent of the time. Table 4.3-7 and Figure 4.3-3 present the projected CDNL and sonic booms for the NTTR airspace units described in section 3.3. Airspace units not shown are subject to CDNL of less than 45 dB or are not authorized for supersonic flight. Calculations of supersonic noise reflect the number of aircraft operations performed in supersonic mode, not total sortie-operations.



	CDNL	Sortie-operations
Baseline	50/51	200,000/300,000
Projected	51/52	251,840/351,840

Figure 4.3-3 NTTR Baseline and Projected Supersonic Noise Levels

Note: Supersonic and boom calculations apply number of aircraft operations in supersonic, not type.

Table 4.3-7 Baseline and Projected F-35 Supersonic Noise Levels and Sonic Boom Frequency

Airspace Unit	***Baseline Sortie-Operations***				***Projected Sortie-Operations***			
	200,000		***300,000***		***251,840***		***351,840***	
	CDNL	*Booms per month*	*CDNL*	*Booms per month*	*CDNL*	*Booms per month*	*CDNL*	*Booms per month*
Elgin	55	24	57	35	55	25	57	39
Coyote	51	10	52	12	51	10	52	13
Reveille	45	2	45	2	46	3	46	3
EC East	45	2	46	2	46	3	47	4
EC South	<45	<2	<45	<2	45	3	46	3
Pahute	<45	<2	<45	<2	46	3	46	3
4807								
R71	<45	<2	<45	<2	46	3	47	3
R74	45	2	46	2	47	4	47	4
R75	<45	<2	<45	<2	46	3	47	4
R76	<45	<2	<45	<2	46	3	47	4

Under the proposed action to increase sortie-operations to 251,840, CDNLs would increase by 1 dB in the Reveille MOA and 2 dB in portions of R-4807. Monthly sonic booms would increase by two in portions of R-4807, while portions of Desert MOA and Reveille MOA would experience an increase of one boom per month. Under the 351,840 scenario, supersonic noise would increase by only 1 dB in the Reveille MOA and portions of R-4807; the booms would increase by about two in most airspace units, except in the Elgin MOA where booms would increase by 4 per month. Increases of 1 to 2 dB would not be perceptible, especially since noise levels would range from 45 to 57 CDNL. Similarly, an additional sonic boom or two per month would not significantly alter conditions over the vast areas encompassed by the airspace units. It is anticipated, however, that there would be an increase in the number of complaints received and that more people would be annoyed by the supersonic activities. While there is this increase, no adverse impacts to hearing or health would occur.

4.3.2 No-Action Alternative

Under the no-action alternative, the proposed beddown of F-35 aircraft at Nellis AFB would not occur. Therefore, Nellis AFB would continue to generate noise levels from their on-going aircraft operations and NTTR noise levels would remain similar to existing conditions as presented in Section 3.3.

4.4 AIR QUALITY

Air emissions resulting from the proposed action were evaluated in accordance with federal, state, and local air pollution standards and regulations. Air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollution concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally-mandated Class I area.

The methodology used in the air quality analysis calculated the increase in emission levels due to the proposed action at Nellis AFB and NTTR of both stationary and mobile sources (Appendix D). According to USEPA General Conformity Rule in 40 CFR Part 93, Subpart B, any proposed federal action that has the potential to cause violations in a NAAQS nonattainment or maintenance area must undergo a conformity analysis (Appendix F). A conformity analysis is not required if the proposed action occurs within an attainment or unclassified area. Since Las Vegas is in nonattainment status for CO, PM_{10}, and 8-hour ozone, an applicability analysis must be performed to determine if project emissions exceed the *de minimis* thresholds or contribute more than 10 percent of the regional emissions. No applicability analysis is needed for the majority of NTTR airspace because it is not located in any areas of nonattainment or maintenance. The exception is a small portion (5 percent) of airspace found in the southeast corner of R-4806 (refer to Figure 3.3-3 illustrating NTTR airspace). The number of projected F-35 flights in this area would be minor because aircraft do not typically fly in corners and the number of operations below 7,000 ft AGL is very few, therefore, only negligible emissions would be created within that area.

When evaluating potential impacts to air quality, compliance with the Final Conformity Rule is presumed if the emissions associated with a federal action, like the F-35 beddown, are below the relevant *de minimis* thresholds during a given year. Because Clark County is designated by the USEPA as being in serious nonattainment for CO and PM_{10}, the *de minimis* thresholds are applied and are 100 and 70 tons per year, respectively. In terms of ozone, Nellis AFB is located within an area of Clark County currently found to be in Subpart 1 (basic) nonattainment for 8-hour ozone. However, Clark County has submitted a request to the USEPA in March 2011, for redesignation to an ozone attainment area and submitted a maintenance plan for approval. The impacts for this criteria pollutant are determined by applying *de minimis* thresholds of its precursor pollutants represented by VOCs and NO_x. *De minimis* thresholds for these pollutants are 100 tons per year for NO_x and VOCs.

4.4.1 Proposed Action

Nellis AFB

The analysis calculated changes in air emissions for those pollutants in nonattainment (CO, VOCs, NO_x, and PM_{10}) as a result of the proposed action, using the same methods and types of input used to determine baseline emissions (see Appendix D). All ground-based emission sources associated with the proposed action were assessed, including construction activities, F-35 engine run-ups, maintenance, testing, and emissions from AGE supporting the F-35. Emissions associated with F-35 airfield operations accounted for taxi, departures, and approaches within the Nellis AFB airfield environment. On-base vehicle travel by construction workers and F-35 personnel commuting in the Las Vegas Valley was also evaluated. No additional government operated vehicles are anticipated with this proposal; therefore, emissions from these sources were not evaluated.

In accordance with General Conformity requirements for maintenance and nonattainment areas, calculated emissions were evaluated against the *de minimis* thresholds of 100 tons for VOCs, NO_x, and CO. For PM_{10}, the *de minimis* threshold used was 70 tons. SO_2 and $PM_{2.5}$ emission evaluations applied 250 tons per year per pollutant as a threshold to determine conformity applicability. This value is used by the USEPA in their New Source Review standards as an indicator for impact analysis for listed new major stationary sources in attainment areas. No similar regulatory threshold is available for mobile source emissions, which are the primary sources for this proposal. Lacking any mobile source emissions thresholds, the 250-ton major stationary source was used to equitably assess and compare mobile sources with stationary sources.

Construction Activities

The emission factors for construction include contributions from engine exhaust emissions (i.e., construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Trenching and grading emissions include fugitive dust from ground disturbance, plus combustive emissions from heavy equipment from trench work during the entire construction period. Paving emissions include combustive emissions from bulldozers, rollers, and paving equipment, plus emissions from dump trucks hauling pavement materials to the various sites. Emissions would occur over the duration of the construction period, which extends from 2011 through 2016 and are provided in Table 4.4-1 and Appendix D. No additional construction is beyond 2014; however, construction initiated in 2014 would be on-going and, therefore, construction workers would continue generating trips through 2016. Also included in these calculations are the emissions associated with construction workers for trips generated on the base and during their breaks. It was assumed that there are enough construction workers in the Las Vegas Valley to support this construction so no new commuting emissions would be incurred; however, it was assumed that workers would travel 4 miles per day within the base and during lunch and breaks.

Table 4.4-1 Nellis AFB Projected Construction Pollutant Emissions							
	Tons/Year						*Metric tons/year*
	VOCs	***CO***	***NO_x***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***CO_2e*** [1]
Nellis AFB Baseline [1]	*331.4*	*941.5*	*473.6*	*346.1*	*40.4*	*ND* [2]	*ND* [3]
2011	0.88	7.90	4.52	0.49	1.96	0.45	585
2012	0.86	7.53	5.04	0.55	2.12	1.49	743
2013	0.32	2.31	1.42	0.16	1.99	0.27	233
2014	0.85	7.58	4.65	0.51	4.16	0.67	625
2015	0.69	6.37	3.97	0.44	2.22	0.44	462
2016	0.67	6.23	3.97	0.44	2.22	0.44	462
De minimis Threshold	100	100	100	-	70	-	-
Major Source Threshold	-	-	-	250	-	250	
Proposed GHG Threshold	-	-	-	-	-	-	25,000

Note: [1]Total for Nellis AFB.
[2]ND=no data. Nellis AFB did not measure $PM_{2.5}$ in 2009.
[3]Unable to calculate without a complete breakdown of all types of generators.

None of the construction-related activities associated with the proposed action exceeds the CO, PM_{10}, or 8-hour ozone (VOCs and NO_x) *de minimis* thresholds, the 250-ton major source threshold, or the GHG threshold. Specific construction activity assumptions and acreages are provided in Appendix D.

F-35 and AGE Emissions

Emissions for the F-35 engine (F135) were calculated using data provided by the Joint Strike Fighter Program Office in charge of design and development of the F-35 aircraft. Engine time in modes, taxi-time, approach, and departure parameters from the test F-35 aircraft were used to estimate emissions since these are the best data available at this time (Personal communication, Joint Strike Fighter Team 2007). Karnes2 flight profiles were used to identify engine power settings, airspeed, altitude and times in mode for each operational profile. Please refer to Appendix D for specific information on sources of these engine emissions. If further revised operational data becomes available and approved for release in Air Force NEPA and CAA General Conformity documentation generally, the Air Force will re-analyze noise and air quality impacts analysis for the proposed action to determine if either supplemental NEPA analysis, or a new CAA General Conformity Determination, is required under the circumstances. F-16 AGE was used as a surrogate for emissions following the Air Force's Air Conformity Applicability (ACAM) Version 4.3.3. This model uses generic AGE for all Air Force fighter aircraft such as the F-15, F-16, and F-22; it is not anticipated that F-35 AGE would differ greatly from the equipment currently used fighter aircraft. Because the proposed action is scheduled to take place over several years, emissions were calculated for the years when the F-35 would be phased into the Nellis AFB inventory: 2012, 2015, and 2017 through 2020. Table 4.4-2 includes F-35 operations and AGE emissions for the defined phase-in years; these are discussed below.

Table 4.4-2 Projected Pollutant Emissions (tons/year) from Combined Construction, Commute, and Aircraft Operations Compared to Significance and GHG Thresholds

Year/Emission Source	***Tons/Year***						***Metric Tons/Year***
	VOCs	***CO***	***NO_x***	***SO_2***	***PM_{10}***	***$PM_{2.5}$***	***CO_2e***
2012							
Aircraft	0.67	8.00	18.67	0.67	5.33	5.17	12,693
AGE	0.34	4.05	2.06	0.16	0.11	0.10	698
*Commuting Personnel	0.98	12.36	0.79	0.01	0.03	≤ 0.03	469
Construction	0.86	7.53	5.04	0.55	2.12	1.49	743
Total	**2.85**	**31.94**	**26.56**	**1.39**	**7.59**	**6.79**	**14,603**
2015							
Aircraft	1.83	22.92	50.42	2.75	15.58	15.12	34,905
AGE	0.94	11.15	5.67	0.44	0.29	0.28	1,918
*Commuting Personnel	1.14	17.25	0.82	0.02	0.05	≤ 0.05	805
Construction	0.69	6.37	3.97	0.44	2.22	0.44	462
Total	**4.60**	**57.69**	**60.88**	**3.65**	**18.14**	**15.89**	**38,090**
2016							
Aircraft	1.83	22.92	50.42	2.75	15.58	15.12	34,905
AGE	0.94	11.15	5.67	0.44	0.29	0.28	1,918
*Commuting Personnel	1.07	16.75	0.82	0.02	0.05	≤ 0.05	805
Construction	0.67	6.23	3.97	0.44	2.22	0.44	462
Total	**4.51**	**57.05**	**60.88**	**3.65**	**18.14**	**15.89**	**38,090**
2017							
Aircraft	2.17	54.17	119.17	6.50	36.83	35.73	41,252
AGE	2.21	26.35	13.39	1.04	0.69	0.67	2,267
*Commuting Personnel	1.02	16.36	0.71	0.02	0.05	≤ 0.05	805
Total	**5.40**	**96.88**	**133.27**	**7.56**	**37.57**	**36.45**	**44,324**
2018							
Aircraft	4.67	58.33	128.33	7.00	39.67	38.48	88,850
AGE	2.38	28.37	14.42	1.12	0.75	0.72	4,883
*Commuting Personnel	0.98	15.99	0.67	0.02	0.05	≤ 0.05	805
Total	**8.03**	**102.69**	**143.42**	**8.14**	**40.47**	**39.25**	**94,538**
2019							
Aircraft	5.33	66.67	146.67	7.11	44.44	43.11	101,543
AGE	2.72	32.43	16.48	1.28	0.85	0.83	5,581
*Commuting Personnel	0.81	15.73	0.94	0.02	0.05	≤ 0.05	805
Total	**8.86**	**114.83**	**164.09**	**8.41**	**45.34**	**43.99**	**107,929**
2020							
Aircraft	6.00	75.00	165.00	8.00	50.00	48.5	114,235
AGE	3.06	36.48	18.54	1.44	0.96	0.93	6,278
*Commuting Personnel	0.81	16.16	0.64	0.02	0.05	≤ 0.05	836
Total	**9.87**	**127.64**	**184.18**	**9.46**	**51.01**	**49.48**	**121,349**
De minimis Threshold (tons/year)	100	100	100	-	70	-	-
Major Source Threshold	-	-	-	250	-	250	
Proposed GHG Threshold							25,000

Note: *Commuting emissions decrease over the years (even with same number of commuters) because each year emissions improve as newer cars replace older cars.

Combined Construction and Aircraft Emissions

Fluctuations in annual emissions would occur as various phases of the proposed action are completed. Short-term increases in air emissions would result primarily from construction activities; long term increases would occur due to F-35 aircraft operations. During construction, dust control permits would be required for disturbance of areas larger than a quarter of an acre (CCHD 2001). Operationally, all new point sources of emissions such as hangars, jet engine test cells, or other buildings would be subject to existing permitting requirements and the base air emissions inventories would require updates to reflect new point sources of emissions. Modifications to the current base-wide Title V Permit would be required if equipment other than mobile AGE were added or replaced. No modification to the Title V Permit is required for changes or additions to mobile equipment used to maintain or service aircraft on the ground. However, Clark County air quality operating permits for an individual piece of equipment would have to be modified for any change to that equipment. Nellis AFB would apply for all modifications to the Title V Permit and the Clark County air quality operating permits after finalization of equipment needs. In April 2007, a consolidated New Source Review permit was issued to Nellis AFB (DAQEM 2008).

Combined construction and operational emissions were calculated to determine if the proposed action would exceed *de minimis* thresholds. Table 4.4-2 presents the anticipated increases in nonattainment pollutant emissions associated with the construction and demolition activities as well as additional emissions from personnel commuting, increased aircraft operations, and increased AGE use. After 2016, the additional emissions would only be due to commuting F-35 personnel and airfield activities (e.g., aircraft and AGE operations) since construction would be completed.

Air emissions calculations for the proposed action produced results indicating that overlapping construction years and aircraft beddown activities do not exceed *de minimis* thresholds for any nonattainment criteria pollutant. However, beginning in 2017, when the inventory of F-35 aircraft reaches 13, NO_x emissions will exceed *de minimis* levels by about 33 tons. Once the full complement of 36 aircraft arrives in 2020, NO_x emissions will exceed the *de minimis* 100-ton per year level by 84 tons. CO emissions would exceed *de minimis* levels in 2020 by 28 tons. Maximum PM_{10} emissions would occur in 2020 and are projected at about 51 tons (*de minimis* is 70 tons). VOC emissions are projected to reach their maximum in 2020 as well, at close to 10 tons (*de minimis* is 100 tons).

With respect to CO, Clark County DAQEM has informed the Air Force (see Appendices D and F) that it included projected F-35 emissions in its area-wide modeling that has already been submitted to USEPA as part of DAQEM’s Maintenance Plan for CO. DAQEM observed that the F-35 project emissions are very small in proportion to the total CO emissions inventory in the Las Vegas Valley, and concluded that no additional local air quality modeling or hot-spot analysis is necessary. Therefore, a positive conformity determination for CO was made by the Air Force in accordance with 40 CFR 93.158(a)(4)(ii).

For ozone, Clark County DAQEM agreed in writing to include Air Force F-35 emissions in any SIP submittal to the USEPA (November 4, 2008). DAQEM and the State of Nevada have issued a written commitment to include the NO_x emissions in the maintenance implementation plan that DAQEM and the State intended to submit pursuant to the provisions of 42 USC § 7505a in connection with a redesignation to attainment request under 42 USC § 7407(d). Subsequently, the County has submitted its *Ozone Request for Redesignation and Maintenance Plan* (or Plan) in March 2011, F-35 and AGE specific emissions have been accounted for in their 2015 and 2022 ozone maintenance goals (CC DAQEM 2011). In Section 4.0 of the Plan, Tables 4-3 and 4-4 of the Plan, all F-35 operational and AGE emissions are accounted for in terms of CO, NO_x, and VOCs (precursor pollutants of ozone). Based on this commitment, the Air Force made a positive conformity determination with respect to NO_x per the provisions of 40 CFR 93.158(a)(5)(i)(B).

Beginning in 2015, GHG emissions associated with the proposed action would be in excess of the 25,000 metric ton per year, at 38,090 metric tons and would increase as additional aircraft are based. By 2020, GHG emissions associated with the F-35 basing are estimated at 121,350 metric tons per year.

Nevada Test and Training Range

Total sortie-operations in NTTR would increase to between 251,840 and 351,840 under the proposed action. F-35 aircraft would contribute 51,840 sortie-operations in NTTR per year after 2024. These F-35 activities would represent 26 percent of total sortie-operations in the low-use and 17 percent of total sortie-operations in the high-use scenarios. Since the Air Force anticipates that the F-35 would operate in NTTR more like the existing F-16s, the distribution of total sortie-operations among the various airspace units matches that of the F-16s. Given this distribution, the proportion of 51,840 F-35 sortie-operations (15,552) that would operate below the 7,000 feet AGL (mixing height) would represent 6.2 percent more sortie-operations under the 251,840 scenario and 4.4 percent under the 351,840 scenario. Only these sortie-operations would contribute to emissions; and baseline emissions would increase proportionally (refer to Table 3.4-3).

Total emissions in NTTR, including those by the F-35, would continue to be distributed throughout a volume of air of 13,000 cubic miles. Air quality effects associated with total NTTR aircraft operations would continue to be minor and both Nye and Lincoln Counties are in attainment for all criteria pollutants. In summary, air quality impacts in NTTR airspace would be negligible.

4.4.2 No-Action Alternative

Under the no-action alternative, none of the construction activities, personnel relocations, or aircraft operations proposed in support of the F-35 aircraft beddown would occur at Nellis AFB, and no proposed F-35 aircraft operations would occur in NTTR airspace. While air pollutant emissions associated with this proposed action would not be generated, activities at the base and within Las Vegas would continue to generate emissions.

4.5 SAFETY

This section evaluates the proposed action to determine its potential to affect safety risks to military personnel, the public, and property. Fire and ground safety are assessed for the potential to increase risk, as well as the Air Force's capability to manage that risk by limiting exposure, responding to emergencies, and suppressing fires. Analysis of aircraft flight risks correlates projected Class A mishaps and BASH with current use of the airspace to consider the magnitude of the change in risk associated with the proposal. Projected changes to uses and handling requirements of explosives are compared to current uses and practices. If a unique situation is anticipated to develop as a result of the proposed action, the capability to manage that situation is assessed. Finally, when the changes in risk arising from the proposed action are considered individually and collectively, assessments can be made about the adequacy of disaster response planning and the need for new or modified procedures and requirements that may become necessary.

4.5.1 Proposed Action

Under the proposed action, the beddown of F-35s for the FDE program and WS would not significantly change and/or degrade safety conditions at either Nellis AFB or NTTR. The beddown and operations of the F-35 would not influence current safety conditions or procedures.

Nellis AFB

Operations and Maintenance

Operations and maintenance activities conducted on Nellis AFB would continue to be performed in accordance with all applicable safety directives. There are no specific aspects of F-35 operations or maintenance that would create any unique or extraordinary safety issues.

As part of the F-35 beddown, some new facilities would be constructed, and other, older facilities would be demolished. New facilities would include buildings on the flightline to support F-35 operations and maintenance, additional munitions support facilities and storage igloos; expansion of the LOLA to support the increased number of F-35 operations; and a new flight kitchen. No unique construction practices or materials would be required that would change existing safety procedures. During construction, standard industrial safety standards would be followed. No unusual ground safety risks would be expected to arise from these activities.

Fire and Crash Response

Fire and crash response would continue to be provided by the Nellis AFB fire department. Although not anticipated, if new response procedures were required for unique materials used in the construction of the F-35, the Air Force will develop them after the production model F-35 is finalized. Under the proposed

action, fire fighters would continue to be fully trained and appropriately equipped for crash and rescue response, the beddown of the F-35 would not change these abilities. Therefore, the proposed action should not adversely impact fire and crash response at Nellis AFB.

Aircraft Mishaps

Historically, when new military aircraft first enter the inventory, the accident rate is higher, making it impossible to predict the potential mishap level of the F-35. Historical trends do, however, show that mishaps decrease the more an aircraft is flown. Over time, operations and maintenance personnel learn more about the aircraft's capabilities and limitations. Some of this experience has already been gained for the F-35 during the research, development, and initial test phase.

By the time the proposed F-35 operations at Nellis AFB begin, the initial OT&E phase of the aircraft's integration into the operational force will have progressed substantially. Significant knowledge will have been gained about the aircraft's safest flight regime. At Nellis AFB, only highly experienced fighter pilots support the FDE phase and develop tactics at the WS. These activities will provide additional data about the aircraft's safe operating parameters and further minimize flight risks. As the programs proceed from 2012 onward, the potential for mishaps would likely decrease to low levels comparable to other fighter aircraft. Since the F-35 design incorporates the most modern technology and knowledge is constantly being gained about the safe operating envelope of the aircraft, the F-35 will operate as safely as, or more safely than, any other aircraft introduced into the Air Force inventory. The majority of flight operations would be conducted over remote areas, where population densities are very low; in the unlikely event that an aircraft accident occurs, it should not create undue risk to people or property on the ground. However, if an accident were to occur, existing response, investigation, and follow-on procedures would be enforced; no new accident response procedures would be required with the F-35 beddown.

Bird/Wildlife-Aircraft Strike Hazards

A total of 233 bird-aircraft strikes have been documented for Nellis AFB over a 14-year period. Implementing the proposed action would not expect to alter this low rate. Two factors support this conclusion: 1) the F-35 would operate like all other fighters that have used Nellis AFB and rarely encounter bird-aircraft strikes, and 2) no aspect of the proposed action would increase concentrations of birds on or near the base. Therefore, BASH is not anticipated to change significantly under the proposed action and not impact this facet of safety at Nellis AFB.

Munitions Use and Handling

On Nellis AFB, numerous new munitions igloos would be constructed within the existing WSA to support F-35 munitions storage. No new safety zones or waivers are anticipated. The proposed action also includes an expansion of the LOLA by 167,322 square feet and would require development of new safety arcs, necessitating the realignment of Hollywood Boulevard. This realignment would ensure the

continued safety zone between Nellis AFB and adjacent communities and not pose a significant impact to overall safety conditions.

Nevada Test and Training Range

Fire Risk and Management

Within NTTR, current procedures to minimize ground safety risks associated with air-to-air and air-to-ground training would continue. Operations and maintenance activities on NTTR would continue to be conducted using current processes and procedures. All actions would be accomplished by technically qualified personnel and would be conducted in accordance with applicable Air Force safety requirements, approved technical data, as well as Air Force federal and state occupational, safety, and health standards.

Although use of NTTR would increase overall levels of ordnance, flare use would remain close to baseline levels at a 6 percent increase. A negligible increase at less than 1 percent in fire risk would result. Further into this safety section (under ordnance), details of fire risks associated with the proposed use of flares by F-35s are presented. The land areas surrounding training ranges ensure public protection by restricting presence in the safety areas associated with laser use, emitters, and targets supporting air-to-ground ordnance delivery. Planned disaster response actions and range fire suppression capabilities have proven adequate in the past and would be expected to be adequate in the future. Therefore, no changes to fire and risk management are anticipated and the potential impacts would be minimal, if any.

Aircraft Mishaps

Aircraft mishaps under current operations were assessed considering a range of expected maximum (351,840) and minimum (251,840) sortie-operations. The greatest indicated risk is associated with use of MOA airspace. Throughout the MOA airspace, statistical projections indicate the probability of a Class A mishap of 0.00003 percent per year (Air Force 1999a). Risks associated with aircraft mishaps for aircraft currently using the airspace are anticipated to remain relatively unchanged. The mishap rate and risk of mishaps for a new aircraft like the F-35 may be higher in its early years, but would be expected to decrease through time to lower levels matching other fighter aircraft. As more information about the operating characteristics of the aircraft is gained, the probability and risk of a pilot exceeding its safe operating regime is minimized. Given this historic pattern, reflecting decreased risk over time, F-35 operations in NTTR would not pose significant safety risks.

Bird/Wildlife-Aircraft Strike Hazards

Between 1995 and 2006, there have been ten documented strikes in NTTR; of these, one resulted in a Class B mishap and three in Class C mishaps. Risk associated with bird/wildlife-aircraft strikes is expected to remain low under the proposed action. The F-35 would fly 70 percent of the time above 5,000 feet AGL, well above the altitude (3,000 feet AGL) where 95 percent of bird-aircraft strikes occur.

Therefore, BASH is not anticipated to change within NTTR to a significant degree and represent a negligible impact if the action were implemented.

Ordnance Use

Use of live and training ordnance would continue on NTTR. Training would also continue to employ flares. The F-35 will also be capable of delivering the JDAM, or equivalent approved ordnance at NTTR. Only trained and qualified personnel would handle ordnance in accordance with all explosive safety standards and detailed published technical data.

The overall type and amount of total ordnance expended would continue near current levels. Added tonnage of ordnance contributed by the F-35 would be less than the normal annual variation on NTTR. Weapons employment procedures are detailed in AFI 13-212 (with Change1, certified January 6, 2010) (Air Force 2010). Operational constraints pertaining to use of specific delivery tactics, ordnance type, or aircraft headings are developed to mitigate any potentially unsafe condition and ensure that ordnance remains within the applicable safety footprint.

No degradation of public safety is expected from release of ordnance by F-35s. As with all aircraft deploying ordnance, weapons safety footprints specifically delivered by F-35s are currently under development. These footprints define safety and operational requirements specific to F-35 ordnance delivery to comply with current safety procedures and restrictions and to ensure all ordnance comes to rest within the approved ranges within NTTR.

Under the proposed action, 16,000 flares would be released annually by F-35s, contributing about 6 percent of the total flare use for NTTR. Even with these minor increases, the Air Force expects baseline safety conditions to continue.

The F-35 would release flares as part of the FDE program and WS sortie-operations, but this activity would not change existing conditions for safety, fire risk, or natural resources. While the actual flare burn time is classified, the minimum flare release altitude for the F-35 is that altitude which allows the flare to burn out prior to 100 feet above the ground. The MOAs release altitudes provide an additional buffer against burning material contacting the ground and is limited to 5,000 feet AGL or above. However, 70 percent of F-35 flight activities and flare releases would occur at 5,000 feet AGL or higher. Since flare releases would commonly be thousands of feet higher than the minimum release altitude, the potential for burning material contacting the ground would be negligible.

In the unlikely event of an inadvertent release of a flare below the minimum altitude, the risk of a wildfire would remain minimal. As described in section 3.5.2, the probability of a fire starting from a single ignition source such as a flare is extremely low, even with the right fuel, wind, and vegetation conditions.

Additionally, flares and flare residues do not pose a health risk to humans or animals because they are not likely to be ingested and the quantities involved are negligible (Air Force 1997a). The very small quantities of flare residues also have little potential to affect soil or water.

4.5.2 No-Action Alternative

Under the no-action alternative, operations on the base and throughout NTTR would continue; however without the F-35. Ground, flight, and ordnance safety considerations associated with current operations, as discussed in section 3.5, would remain in place to ensure the continued safety of the public, military personnel, or property. Since these considerations would not change under the no-action alternative, it would not result in significant impacts.

4.6 LAND USE AND RECREATION

Impact analysis for land use requires identification of management plans and use areas, followed by determination of potential effects due to aircraft operations. In this section, the Clark County Airport Noise Environ contours were used as the baseline for comparison since these are the contours applied by the county for planning and development purposes. According to the Federal Interagency Committee on Urban Noise, noise exposure greater than 65 DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas. This section focuses on the impacts due to noise from the proposed action on land ownership or land status, general land use patterns, sensitive receptors, land management plans, and special use land management areas.

Potential issues and concerns regarding recreation and visual resources arising from the proposed action include an increase in noise and overcrowding of recreation facilities on base. The methodology for determining impacts on recreation resources focuses on: 1) determining existing users, and 2) determining the noise and visual impacts on recreational use due to a change in sortie-operations on NTTR and airfield operations at Nellis AFB.

4.6.1 Land Use

Nellis AFB

On-Base Land Use

Land use on base would not be negatively impacted by the proposed aircraft beddown. Based on the analysis of proposed aircraft operations, Area I and portions of Areas II and III would continue to be exposed to DNL noise levels of 65 dB or greater; however, these proposed noise levels are consistent with existing on-base conditions and facilities and land uses within the noise contours would remain compatible.

The proposed action calls for new on-base facilities and the demolition of older on-base facilities (refer to Figure 2-2). The proposed facilities would be sited to ensure compatibility with existing and proposed on-base land uses. The majority of the facilities would be sited on previously disturbed land within the industrially developed portion of the base or those areas set aside for munitions storage. The siting of the facilities would be consistent with the present land use and the Nellis AFB General Plan.

Off-Base Land Use

This section compares the projected F-35 noise contours to the existing land uses, zoning, and ordinances associated with the Clark County Airport Noise Environs (see Section 3.6.1, Nellis AFB, Off-Base Land Use for discussion). As indicated in Table 4.6-1 and depicted in Figure 4.6-1, areas affected by noise in the 65 dB DNL contour bands and greater would decrease when compared to the land use contours established by Clark County, with the largest decrease in the 70 to 75 dB DNL contour band.

Table 4.6-1 Projected F-35 Noise Levels (dB DNL) Compared to Clark County Airport Noise Environ Contours (in acres)

	65-70	*70-75*	*75-80*	*80-85*	*>85*	*Total*
Projected Acres	13,991	6,259	2,804	1,268	1,338	25,660
Clark County Airport Noise Environs*	17,755	9,281	3,778	1,734	1,619	34,167
Change from Projected	***-3,764***	***-3,022***	***-974***	***-466***	***-281***	***-8,507***
Percent Change	***-21%***	***-33%***	***-26%***	***-27%***	***-17%***	***-25%***

Note: *These contours are used by Clark County specifically for zoning and land use purposes and differ from noise contours used by the Air Force.

Table 4.6-2 presents land uses and projected acres affected by noise contour bands 65 dB DNL and greater. When compared to Clark County land use planning contours (refer to Table 3.6-5), all land use categories affected by noise levels 65 dB DNL and greater would experience a decrease. The only exceptions are land uses in the commercial (experiencing less than a 1 percent increase) and military (increases by about 15 percent) categories. The greatest decrease is seen in the residential acreage where there would be 1,280 fewer acres affected by noise levels greater than 65 dB DNL and for public lands that would reduce by 1,046 acres, or 38 and 31 percent, respectively.

Table 4.6-2 Land Use Acres Affected by Projected F-35 Noise Levels (dB DNL)

Land Use Category	*65-70*	*70-75*	*75-80*	*80-85*	*> 85*	*Total Acres*	*Total (%)*
Commercial	1,971	1,586	4	0	0	3,561	14%
Industrial	3,869	2,558	1,185	94	1	7,707	30%
Mixed Use	339	0	0	0	0	339	1%
Open	38	13	0	0	0	51	0%
Public	1,770	452	104	0	0	2,326	9%
Recreational	0	0	0	0	0	0	0%
Residential	1,938	74	0	0	0	2,012	8%
Military	4,066	1,576	1,511	1,174	1,337	9,664	38%
Total	**13,991**	**6,259**	**2,804**	**1,268**	**1,338**	**25,660**	**100%**

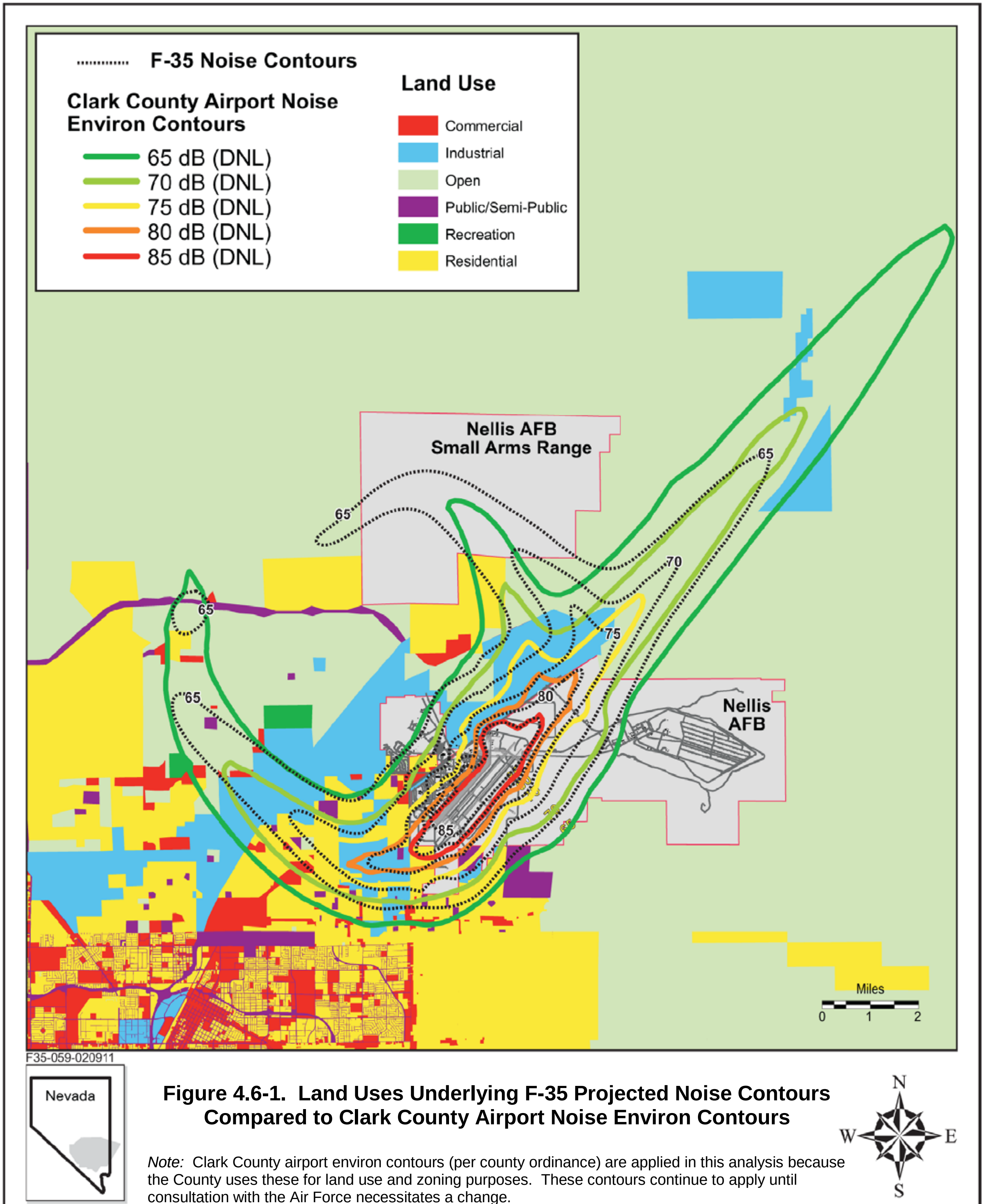


Figure 4.6-1. Land Uses Underlying F-35 Projected Noise Contours Compared to Clark County Airport Noise Environ Contours

Note: Clark County airport environ contours (per county ordinance) are applied in this analysis because the County uses these for land use and zoning purposes. These contours continue to apply until consultation with the Air Force necessitates a change.

Although noise levels for the 2,012 acres of residential land, potentially affected by the proposal, would exceed common recommended standards (FICON 1992), most areas under the projected noise contours would fall within those already zoned for these levels ((Clark County 1998). Residential and other noise sensitive developments are generally not encouraged in any of the noise exposure zones; however, residential developments currently exist in those zones. To minimize exposure to noise sensitive land uses, permitted uses and building construction are regulated in the environs of Nellis AFB (Clark County 1998), and various levels of noise attenuation in building construction (i.e., "sound proofing" for interior noise reduction) are required by the county. Residential areas located to the south and west of Nellis AFB would continue to be exposed to noise levels of 65 to 80 dB DNL under the proposed action, but would occur in areas exposed to these noise levels in 2003. Land under the projected 65 dB DNL noise contour and east of Nellis AFB that was not exposed to noise exceeding 65 DNL in 2003 is primarily open land (see Figure 4.6-1).

Some land use would remain incompatible with noise levels in the vicinity of Nellis AFB. Even with noise attenuation standards, land use and zoning regulations applicable to areas adjacent to the base would be incompatible with both current and expected noise levels generated by aircraft operations at Nellis AFB. The Air Force already employs, and would continue to undertake, measures to reduce aircraft noise effects. These measures include the following: flight safety, noise abatement, and participation in the land use planning process (refer to section 3.6) (Air Force 2004c). Specifically, the Air Force would continue to enforce:

1. Flying Safety—Maintain aircraft and train aircrews to avoid aircraft accidents. The F-35 FDE program and WS beddown would not change the existing configuration of CZs and APZs and existing safety procedures would be followed per established procedures.
2. Noise Abatement Procedures—Reduce noise impacts to adjacent communities by restricting nighttime flying activities and routing flights over less populated areas.
3. Land Use Planning—Coordinate and consult with county and city agencies in their planning and zoning decisions. This ensures land use compatibilities for future growth while accommodating the military mission.

Nevada Test and Training Range

The additional sortie-operations and activities by the F-35 aircraft represent the element of the proposed action with a potential to affect land use under NTTR. Such impacts would be indirect, stemming from aircraft overflights and aircraft noise and should represent only negligible impacts to land use.

Under the proposed action, land status and land use patterns within NTTR would not be altered. Since land uses in this area have remained the same for many years and have been exposed to aircraft operations since the formation of Nellis AFB in the 1940s, the changes in use associated with the proposed F-35 beddown have a negligible potential to impact land use. First, subsonic noise levels could change by up

to 3 dB, but given the expanse of the area affected, the amount of lands within the range, and the past exposure of the lands to aircraft noise, the change in noise levels would not impact land use (see Section 4.3, Nevada Test and Training Range). Second, increases in supersonic flight activity would result in a minimal increase in the number of sonic booms experienced at ground level. Sonic booms would be 2 or less per month except in Desert MOA/Elgin airspace where booms would increase by 4 per month. Increases in sonic booms in R-4807 would not affect land use because the area is already restricted from public access. Since the increase in sonic booms beneath the Elgin airspace in the Desert MOA are minimal (2 per month), and because the intensity of booms reaching the ground would be similar to existing conditions, impacts to land use resulting from sonic boom exposure would not be adverse.

4.6.2 Recreation

Nellis AFB

As a result of the proposed action, a minimal increase of personnel using on-base facilities could occur by 2020. Recreation activities and sports leagues are evaluated annually. Influxes of personnel are common on the base due to the large number of temporarily assigned personnel. Therefore, an increase in base personnel as a result of the proposed action would not adversely affect recreation activities on base. Recreation is not expected to be affected by noise resulting from the proposed aircraft operations because these noise levels are consistent with the existing base noise environment.

Currently, there are five local parks within the 70 DNL noise contour (see Table 4.6-1); the number of parks affected would not change under the proposed action. The 70 DNL noise level is considered an acceptable level in accordance with current Clark County regulations. An additional seven noise-sensitive receptors (i.e., schools and churches) would fall within the 65 to 70 DNL contour which is within acceptable levels. In summary, land use and recreation resources at Nellis AFB would be impacted; however, the overall impact would not be adverse.

Nevada Test and Training Range

Access by the public to NTTR withdrawn areas is restricted; therefore, very little recreation activity occur there. Hunting is the only recreational activity allowed on NTTR. Only under permit conditions and existing MOUs are recreational visits allowed. Because the proposed action does not require a change in access for hunting, would not change the amount of land available for hunting, and would present a minimal impact to wildlife hunted (e.g., mule deer), hunting opportunities are not expected to change. Hunting on the range would continue to be coordinated with the NDOW and USFWS.

Subsonic noise levels vary over NTTR from 45 DNL to 67 DNL (refer to Figure 4.3-2). Much of the airspace associated with NTTR is located over DoD or DOE controlled land with restricted recreation use.

Underneath NTTR, increases in subsonic noise levels would not increase by more than 3 dB; therefore, impacts are expected to be negligible.

Average supersonic exposures would increase as a result of the proposed action. Under the Desert MOA/Elgin airspace, the average number of sonic booms would increase from 24 to 25 booms per month under 250,000 sortie-operations and from 35 to 39 under 350,000 sortie-operations. Under the Desert MOA/Coyote airspace, the average number of sonic booms would increase from 12 to 13 under 350,000 sortie-operations. Under the Reveille MOA, the average number of sonic booms would increase from 2 to 3 booms per month. There are a number of recreation areas under these MOAs (see Figure 3.6-6) including Key Pittman Wildlife Management Area, White River Petroglyphs site, Beaver Dam State Park, and Ella Mountain. These sonic booms could be perceived as annoying to recreation visitors in a wilderness setting. However, due to the subjective nature of annoyance from noise disturbance and because the area is currently subject to sonic booms, some visitors would not be annoyed by the increase. Recreation visitors in developed areas would probably not be affected, because these areas tend to have higher ambient noise levels.

In all other MOAs and restricted airspace, the frequency of sonic booms is expected to increase by 1 boom per month except for EC East and portions of R-4807, which would increase by 2 booms per month. However, no recreation is permitted in this area; therefore, no adverse impacts are expected under the proposed action.

No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB. Implementation of this alternative would not change how land is managed or used. Access to and availability of recreational resources at the base would not be affected by the F-35 basing. Military use of NTTR would continue and generate the associated noise similar to those found under current conditions. Therefore, under this alternative, no further impacts to land use or recreation resources are expected.

4.7 SOCIOECONOMICS AND INFRASTRUCTURE

Analyses of potential impacts to socioeconomic resources performed for this EIS considered both economic and social characteristics of the affected environment. These characteristics include the size and demographic composition of the population; employment, income, and other general economic indicators; and population-related resources such as housing and public schools.

Assessment began with a determination of the economic impact of current operations at Nellis AFB presented in section 3.7. Data used to summarize current conditions were obtained from the Nellis AFB Public Affairs Office; data for Clark County were obtained from the U.S. Census Bureau and Clark County Finance and Public Works web sites. Assessment of the base's current socioeconomic impact on the affected region enables the most accurate projections possible of potential impacts to affected resources upon implementation of the proposed action.

4.7.1 Proposed Action

Population

Nellis AFB would experience an increase of active-duty personnel associated with the F-35 FDE program and WS beddown proposal beginning in 2012 and peaking in 2020. The total change would result in a net increase of 412 active-duty personnel at Nellis AFB in FY22. On average, each military staff member is anticipated to have 2.55 dependents and this was used in calculating potential effects of the proposed action (Air Force 2008). Table 4.7-1 provides base population changes associated with the proposed action.

Table 4.7-1 Comparison of Existing and Projected Staff and Dependents at Nellis AFB

	Staff	***Dependents***	***Total***
Existing Baseline (2009)	12,975	33,086	46,061
Projected 2012	13,197	33,652	46,849
Projected 2014	13,372	34,099	47,471
Projected 2020	13,387	34,137	47,524
Change in Baseline	**412**	**1,051**	**1,463**

Under the proposed action, the Nellis AFB active-duty and civilian personnel would increase by approximately 3.2 percent when compared to the existing baseline. When compared to the 2009 population of Clark County, this represents a less than 0.02 percent increase. This increase would not have an adverse impact on local or regional demand on community services, utilities, or housing. In addition, normal fluctuations in personnel and the rate of rapid growth in the region would likely make this change unnoticeable.

Ancillary increases to the local population are impossible to accurately predict but could be as many as several hundred. The majority of these personnel would be contractor employees of construction firms and the aircraft manufacturers. Fluctuations in programs, funding, and staffing would continue at Nellis AFB, likely making such a minor change unnoticeable.

Employment and Earnings

Employment

In FY08, the workforce at Nellis AFB was composed of 12,975 persons (Air Force 2008). As one of the single largest government employers in Clark County, Nellis AFB and its continuing operations represent a major source of local (i.e., North Las Vegas) economic activity. Because Nellis AFB is among the area's largest employers, the gain of 412 personnel positions would not have a noticeable impact on employment when placed in context with the regional environment of Clark County and Las Vegas.

Construction activity associated with the beddown decision would peak in FY13 with project expenditures of over $182 million. Construction activity would contribute to the local economy although the potential effects would be minor and temporary. Construction costs under the proposed action would be minor in comparison to the billions of dollars generated in the Las Vegas region.

Earnings

Nellis AFB is a major employer in the region, with total annual payroll expenditures of more than $922 million in FY08 (Air Force 2008). Active duty military personnel at Nellis AFB received on average $73,198 annually. Based on this FY08 average, the addition of 412 personnel at Nellis AFB associated with the proposed action would generate nearly $30.2 million in payroll disbursements in the region representing approximately 3.3 percent of the Nellis AFB FY08 payroll.

Infrastructure

Housing

Between 2012 and 2020, a slight need for off-base housing units may arise for those persons arriving in the area. With the housing downturn in the Las Vegas region over the last few years, it is anticipated that there would be sufficient and suitable (e.g., new) off-base housing available to personnel associated with the proposed action. Military family housing, combined with off-base supply, would be sufficient (and inherently suitable) to accommodate personnel changes associated with the proposed action.

Public Schools

In the 2010/2011 school year, a total of about 309,893 students were enrolled in 357 Clark County schools (CCSD 2010). The Air Force estimates that during years 2012 to 2020, the student population in the Clark County School District would increase, peaking in 2020 with about 600 new pupils due to the

increase of active-duty personnel at Nellis AFB. This student growth would occur over the 10-year period, and the increase would be negligible compared to the rapid growth of Clark County.

These schools would continue to receive federal Impact Aid for each child attending school off base in lieu of taxes.

Utilities

Electric Power and Natural Gas

There would be no appreciable change in demand for utilities under the proposed action; utility use would be minimally above baseline or no-action conditions. New facility construction under the proposed action would likely employ new energy efficient hot water boilers and cooling systems to reduce the impact on the existing electrical infrastructure. Minor upgrades to the existing electrical system (i.e., electrical pole replacement and circuit feeder enhancements) completed since 2003, in combination with upgrades intended to free up additional capacity, ensure capacity would be adequate to meet the new requirements (Air Force 2008).

Potable Water

Demand for potable water is expected to increase with the addition of aircraft, personnel, and dependents under the proposed action; however, water supplies would be sufficient to meet future demands. Construction activities over a 5-year period and gradual personnel increases of about 3.5 percent (beginning in 2012 and peaking in 2020) would be expected to increase water consumption; however, the increases would not be expected to have an appreciable effect on the availability of groundwater at Nellis AFB or in the surrounding areas. Full implementation of the F-35 programs in 2020 would result in use of approximately 446,000 gpd of groundwater. Nellis AFB currently is allotted 7.1 million gpd (combined surface and groundwater sources). Overall, water usage would increase from implementation of F-35 program activities and the addition of 412 base personnel and their dependents, but the effect on the availability of groundwater at Nellis AFB or in the surrounding areas would be minimal, would be well below the base's allotment, would occur over an 8-year period, and would not require Nellis AFB to seek additional water rights.

Wastewater Treatment

No adverse or significant impacts to wastewater treatment would be anticipated under the proposed action at Nellis AFB. Clark County Water Reclamation District's Main Facility treats over 110 million gpd of wastewater (CCWRD 2011). Proposed F-35 activities along with increased base personnel and dependents would generate less than one half million gpd of wastewater to be treated, which would represent less than 0.5 percent of the CCWRD Main Facility capacity.

Transportation

The Nellis AFB roadways would experience increased traffic levels associated with construction equipment; the increased levels may create congestion during peak traffic periods (i.e., morning and evening rush hours). Traffic levels on the base would be moderate to high during the construction period. Although effects of projects under the proposed action on existing transportation resources would be noticeable, they would be temporary and localized in portions of the base. Nearby Las Vegas and Nellis Boulevards, Craig Road, and I-15 would be able to accommodate the anticipated temporary level of increased construction traffic.

Employment on the base in FY08 was approximately 12,957 jobs of which approximately 10,947 employed persons (i.e., military and civilians) lived off base. Data collected by the Bureau of Transportation Statistics indicate approximately 86 percent of vehicular travel is via personal vehicle. This percentage has been used to estimate the potential for approximately 9,414 vehicle trips during each peak travel period in the vicinity of and on Nellis AFB (BTS 2011). The anticipated increase of active-duty personnel (see Table 4.7-1) during years 2012 to 2020 could impact on-base traffic patterns. However, the additional personnel numbers would fall within normal variation for the base and would occur over an 8-year period. The increased personnel and associated traffic would not be expected to have a discernible effect on traffic at access gates or adjacent intersections.

4.7.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE and WS at Nellis AFB. Implementation of this alternative would not affect the overall socioeconomic resources and opportunities associated with Las Vegas. In addition, infrastructure resources would not be impacted by selecting this alternative.

4.8 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

4.8.1 Proposed Action

For the proposed action, noise levels of 65 DNL or greater were identified. The affected population under these areas was determined using USCB 2005 census zone data to calculate the percentage of residential land use under each noise contour. The original population estimates were then multiplied by the residential portion to achieve the population estimates under each noise contour.

Nellis AFB

Minority and Low-Income Populations Affected by Noise Greater than 65 dB DNL in the Vicinity of Nellis AFB

	Baseline	*Projected*
Total Population	40,957	57,736
Minority	30,257	42,272
Low-Income	5,406	6,673

Minority and Low-Income Populations

Under baseline conditions noise levels of 65 dB DNL and greater affect 74 percent minority and 18 percent low-income populations of the total Clark County population (refer to Table 3.8-1). Many of these persons live in the residential area associated with Sunrise Manor and other unincorporated communities near the base. As such, these groups bear a greater share of noise impacts than the surrounding population as a whole.

Under the proposed action, noise levels of 65 dB DNL or greater would expand off base relative to baseline noise conditions; however, the percentage of minority and low-income populations currently affected by noise levels of 65 dB DNL and greater would decrease slightly to 73 and 16 percent respectively (Table 4.8-1). As noted previously, the proportion of the minority population in the affected area of Clark County grew by 16 percent since 2000 census. Thus, a large part of the disproportionate effect is attributable to population patterns rather than changes to noise contours.

Table 4.8-1 Minority and Low-Income Populations in the Vicinity of Nellis AFB Affected by Noise Greater than 65 DNL under the Proposed Action

DNL	*Total[1] Population*	*Minority Population*	*Percent Minority*	*Low-Income Population*	*Percent Low-Income*
65 – 70	39,160	29,092	74%	4,578	16%
70 – 75	16,103	11,576	72%	1,998	17%
75 – 80	1,971	1,313	67%	89	11%
80 – 85	483	284	59%	8	8%
> 85	18	7	40%	0	9%
Total	**57,736**	**42,272**	**73%**	**6,673**	**16%**

Source: [1]USCB 2006 – based on 2006 Population Estimates and 2000-2005 Poverty Estimates and Southern Nevada Consensus Population Estimate, July 2005.

Zoning regulations currently require all new residential construction within areas affected by noise levels of 65 dB DNL and greater to include noise attenuation features. Noise attenuation from current standard construction practices can reduce indoor noise by 20 dB or more (Department of the Navy 2005). The Air Force will continue to work with Clark County and other local officials who seek to establish or modify noise attenuation measures. The Air Force will also continue to employ noise abatement procedures around the base including expedited climb-outs for all aircraft and restrictions on the time and the direction of flight activities.

Protection of Children

Under the proposed action, the Nellis Terrace Housing Area and Lomie G. Heard Elementary School continue to be found within the 70 dB DNL and greater noise contour bands. The beddown of F-35 aircraft would not result in a shift in location or change in shape of affected CZs or APZs (i.e., safety zones); therefore, no change in regards to the safety of children on the base and within the local community would be expected. No environmental restoration sites are located in areas of the base that would pose a potential health risk to children.

In summary, Nellis AFB will continue to work with Clark County and other local officials to support enforcement of existing zoning ordinances and to assess the adequacy of noise abatement measures. If changes are found to be needed to address noise conditions, the Air Force will assist local officials who seek to establish or modify noise attenuation measures.

4.8.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB; therefore, impacts to human health and environmental conditions in minority and low-income communities would continue similar to those depicted in Table 3.8-1. Potential risks to the safety of children would remain at *status quo* under the no-action alternative.

4.9 SOILS AND WATER RESOURCES

Analysis of the potential impacts to soil and water resources employs the following steps: identifying locations where the actions may directly or indirectly affect soil resources, defining the nature of the affected earth resource, and evaluating the degree to which the characteristics, abundance, or value of the resource would be altered, depleted, or degraded. In terms of water resources, no aspects of current operations at Nellis AFB affect either hydrologic setting or water sources; this would not change under the proposed action. Therefore, this analysis focuses on potential effects on water use, availability, and quality.

Since changes associated with the proposed action in NTTR would not alter any existing soil or water resource conditions due to ordnance delivery, range maintenance, and overflight activities, this section discusses only potential impacts on Nellis AFB.

4.9.1 Proposed Action

Soils

The potential for impacts from the proposed action on Nellis AFB would be associated with construction of new facilities and, to a lesser degree, alteration of existing facilities. Soil loss and erosion could potentially take place and is discussed below.

Approximately 36 acres would be disturbed over the 5 years of construction activities. Site grading associated with construction of the flightline, munitions, administrative, support, and housing facilities as well as the Hollywood Boulevard realignment and infrastructure (e.g., communication, power, and water lines) upgrades would be the primary activities with the potential to affect soil resources. Grading would cause loss of some disturbed ground cover for new facilities, which would increase the potential for soil erosion. However, several factors indicate that erosion and soil loss would be negligible. First, most of the proposed construction would occur on previously developed land or replace existing buildings. Second, construction activities would take place over 5 years, limiting the total area exposed to erosion at any one time. Third, low precipitation (4 inches per year) and low runoff (0.2 to 2.1 inches per year), combined with the flat topography of the base, would substantially reduce the potential for erosion. Fourth and lastly, Air Force and Clark County requirements to employ standard construction practices (e.g., soil stockpiling, watering, covering, and wind restrictions) would further limit both wind and water erosion. Based on these factors, construction grading would not measurably degrade soil resources through erosion or loss.

Water Availability, Quality, and Stormwater

Under the proposed action, potential impacts to water availability and quality would be greatest when construction activities coincide with personnel increases in the years 2012 to 2020. Therefore, these are the years that are being evaluated. In terms of surface waters, no appreciable effects are expected at Nellis AFB or in the surrounding areas. Surface water for Nellis AFB is transported via pipelines from Lake Mead. Sources of groundwater are available from the principal alluvial-fill aquifer underlying the Las Vegas Valley. Although proposed changes in operations and personnel would increase the use of water during years 2012 to 2020, the increase in personnel would be only about 3.5 percent at its peak in 2020, and on-base construction would be temporary. Use of water for F-35 program activities (e.g., aircraft washing) and on-base personnel would minimally increase at Nellis AFB but would be well within the amount of water allocated to the base. Currently, Nellis AFB is allotted about 7.1 million gpd (combined surface and groundwater sources) and uses an average of 2.5 million gpd between October and April to 5.4 million gpd from May to September. Full implementation of the F-35 FDE program and WS in 2020 would result in approximately 355,180 gpd to 446,419 gpd increased water use—a 5 to 6 percent increase. This increase is well within Nellis AFB's water allocation and would not require Nellis AFB to seek additional water rights.

Projected on-base construction would disturb existing groundcover, but the potential for soil loss, erosion, and sedimentation would be temporary and limited in scope. Required use of best management practices (soil cover, watering, and stockpiling) would further reduce this impact.

The proposed action includes paving and construction of buildings with impermeable surfacing. During construction at Nellis AFB, soils would temporarily be exposed to compaction, impeding drainage and reducing water infiltration. In other areas, such activities could increase runoff volumes and could alter current hydrological processes. However, the base lacks significant open water bodies. Since no surface water resources of consequence are located on base, implementation of the proposed action would not significantly impact surface water. Existing stormwater control measures as well as adherence to spill prevention and countermeasure plans would provide for protection of surface water sources during construction and use of facilities, so the potential for base or off-base surface water quality to be affected would be negligible.

Construction and paving associated with the proposed action would result in slightly fewer acres available to facilitate groundwater recharge, but the impact would be negligible given the low average annual precipitation and the lack of year-round surface water on base. Infiltration historically and naturally has been a minimal source of recharge.

No floodplains are found on base. Since the existing potential for flooding on Nellis AFB is minimal, the proposed action would not increase flood hazards on the base.

4.9.2 No-Action Alternative

Implementation of the no-action alternative would result in no construction in support of the F-35 beddown. As a result, no change in topography or soil erosion would occur that is associated with this proposed action. Furthermore, no increases in water use, availability, or quality would occur that would be associated with the proposed beddown.

4.10 BIOLOGICAL RESOURCES

Determination of the significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, 2) the proportion of the resource that would be affected relative to its occurrence in the region, 3) the sensitivity of the resource to proposed activities, and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of special concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of special concern.

This section analyzes the potential for direct or indirect impacts to biological resources from implementation of the proposed action. Direct impacts would be associated with the proposed construction and operation of facilities at Nellis AFB and direct and indirect impacts could result from the proposed operation of the F-35 within NTTR.

4.10.1 Proposed Action

Nellis AFB

Vegetation

The proposed action would require the construction of new facilities, demolition of older facilities, and improvements to infrastructure. Since construction activities, structural modifications, and demolition associated with the proposed action would occur predominantly in previously disturbed areas that currently support no sensitive plant species or wetlands, there would be no adverse impacts on vegetation at Nellis AFB.

Wetlands and Jurisdictional Waters of the United States

No designated wetlands or areas exhibiting wetland characteristics exist on or near the sites proposed for construction; therefore, implementation of the proposed action would have no impact on wetlands. The construction activities in the LOLA area and Area II could intersect arroyos, which could be jurisdictional waters of the U.S. While the impacts to the jurisdictional waters of the U.S. would be minimal, a Section 404 Permit and consultation with USACE would be conducted to determine the presence of jurisdictional waters of the U.S. prior to construction activities, if required.

Wildlife

Since the proposed facilities construction and modifications would occur on previously developed areas that are predominantly graded or paved, proposed construction activities would not result in measurably adverse impacts on terrestrial wildlife. An increase of about 7,562 acres would occur under the projected noise contours (i.e., above 65 DNL) with the addition of the F-35 at Nellis AFB. Wildlife species

inhabiting area under noise contours associated with the base have likely habituated to aircraft noise; the proposed noise levels are not expected to adversely affect these species at Nellis AFB.

Bird/wildlife-aircraft strikes have not historically presented an operational constraint to Nellis AFB. In the course of a 14-year period, there have been a total of 233 bird-aircraft strikes within the immediate vicinity of the base involving Nellis AFB aircraft (see section 3.5/4.5, Safety). The proposed action would increase base airfield operations by 20 percent and it is likely to result in an increase in bird/wildlife-aircraft strikes. However, because the F-35 would operate like all other fighters that have used Nellis AFB and they rarely encounter bird/wildlife-aircraft strikes, then it is likely that no aspect of the proposed action would significantly increase BASH to unsafe levels.

Special-Status Species

The only special-status species found on base is the desert tortoise, listed as threatened by both the USFWS and NDOW. Surveys conducted in 1992 found a small population in the northeastern portion of Area II. A recent USFWS opinion (USFWS 2007) regarding future impacts to the desert tortoise population in Areas I, II, III and the Small Arms Range of Nellis AFB indicated any impacts would not likely jeopardize the continued existence of the desert tortoise. According to 50 CFR Section 402.16, any new Air Force action not considered in previous biological opinions that may effect the desert tortoise in Area II, would require reinitiation of consultation with the USFWS. Nellis AFB will consult with the USFWS to avoid impacts to the tortoise due to construction activities under the proposed action if such activities occur in areas not covered in the 2007 programmatic biological opinion. As with other wildlife having likely habituated to aircraft noise, the proposed noise levels are not expected to adversely impact the desert tortoise.

The Las Vegas bearpoppy and Las Vegas buckwheat, currently listed as a species of concern, are located in Areas II and III on Nellis AFB. Construction activities would avoid these species and therefore, they would not be impacted. Except in Area II, construction would not occur in areas likely to be inhabited by the chuckwalla. In Area II, surveys will be conducted prior to construction and any chuckwalla found would be relocated. The western burrowing owl is common on the base and in the areas slated for construction. To the extent possible and considering the FY03 Defense Authorization Act, Section 315; the provisions of the Migratory Bird Treaty Act will be implemented, provided such provisions do not impact the military mission. These provisions can include surveys, relocation, and limiting ground disturbing activities to non-breeding season for the owls.

Nevada Test and Training Range

Vegetation

Potential impacts to vegetation resources were evaluated for both direct and indirect effects as a result of fire; ordnance delivery, recovery, and removal; and maintenance of targets.

The use of flares and ordnance delivery may occasionally result in accidental fires which could adversely affect vegetation and wildlife habitat by removal of plant cover (short-term effect) or altering the plant community (long-term effect). Removal of vegetation can also lead to increased erosion and sedimentation that can cause long-term environmental change. The level and extent of effects on biological resources are site specific and depend on factors such as plant community type (i.e., adaptation to fire), season, and frequency of fires.

The North and South Ranges occasionally experience fires due to munitions spotting charges and a few caused by flares. However, wildfires caused by lightning make up the significant proportion of fires on NTTR. Techniques used to limit fires from spreading include fire breaks around targets, on-site fire spotting, and fire suppression crews (Air Force 1999b). An MOU exists between Nellis AFB and BLM establishing basic procedures and responsibilities for fire prevention, reporting, and fire suppression and management.

Existing operational restrictions (altitude restrictions, fire rating restrictions, flare types permitted) are greater in MOA training airspace over non-DoD land. Restrictions at NTTR set a 5,000-feet AGL minimum release altitude in MOAs (Air Force 1999b). The most prevalent procedures currently used to reduce fire risk from flares are suspension of flare use during periods of high fire risk and restricting the release altitude of flares. Suspension of flare use during high-risk periods appears to be an effective procedure to reduce fires (Air Force 1999b). Although four to five fires occur on NTTR every year, they tend to be small and contained within the target areas, which are generally devoid of vegetation or have fire breaks around them. With the existing and continued restrictions and guidelines for flare use over MOAs and restricted airspace, the potential for fire ignition is rare. Therefore, impacts to vegetation underlying MOA and restricted airspace due to flare use would not be adverse.

Under the proposed action, F-35s would use existing target areas on NTTR for ordnance delivery and training; no new roads, targets, or facilities would be built. Since flight activities do not result in any ground disturbance, habitat underlying the MOAs and restricted airspace would not be adversely impacted under the proposed action.

Wetlands

Wetlands in the North and South ranges are composed of springs, seeps, and the pools, small streams, and saturated soils they support; there is only one perennial creek found on either range. Due to the dispersed nature of these resources and the lack of any ground-disturbing activities (e.g., ordnance use) at or near any wetland area, impacts to wetlands would not be significant. Since the lands underlying the MOAs and restricted airspace would not be subjected to any substantial or different increases of ground-disturbing activities (i.e., ordnance delivery), wetlands found there would not be adversely affected by the proposed action.

Wildlife

Potential impacts to wildlife were evaluated for both direct and indirect effects as a result of fire, ordnance delivery, recovery and removal; maintenance of targets; fires; and noise. For a discussion of bird/wildlife-aircraft strike hazards see sections 3.5 and 4.5.

There is a possibility that flare use and ordnance delivery may start accidental fires. Impacts to wildlife resulting from fire would be due to habitat disturbance, similar to those described for vegetation; these impacts would be short term and would not be significant. Fires would be less likely to occur in MOAs because ordnance delivery, the predominant cause of military related fires, would not occur and flare use would be restricted.

Under the proposed action, F-35s would use existing NTTR target areas for ordnance delivery and training; no new roads, targets, or facilities would be built. Lands underlying the Desert and Reveille MOAs would not be subject to any ground-disturbing activities. Because there would be no greater ground-disturbing activities from implementation of the proposed action, no changes to existing conditions to wildlife habitat would occur.

The greatest impact to wildlife from aircraft overflights is from the visual effect of the approaching aircraft and the related noise. Most reactions by wildlife to visual stimuli occur in response to overflights below 1,000 feet AGL (Lamp 1989; Bowles 1995).

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies on subsonic aircraft disturbances of ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects of startle and elevated heart rate are transient and of short duration and suggest that the animals habituate to the sounds (Workman *et al*. 1992; Krausman *et al*. 1993, 1998; Weisenberger *et al*. 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl, grebes) from aircraft low-level flights were found to be brief and not detrimental to reproductive success (Smith *et al*. 1988; Lamp 1989; Ellis *et al*. 1991; Grubb and Bowerman 1997). Consequently, changes to the number and types of overflights are expected to result in minor impacts to wildlife or wildlife populations.

Subsonic noise levels and overflights associated with the proposed action over the entire NTTR are similar to those for baseline conditions and the negligible increase would not be perceptible. Since there is essentially no change, the proposed action would result in minor impacts to wildlife from subsonic noise.

Supersonic operations would take place within currently authorized areas of NTTR. Little to no change in supersonic noise levels and sonic booms would occur. As such, supersonic noise conditions would remain roughly identical to baseline.

Studies of the effects of supersonic noise on birds and mammals have suggested that animals tend to habituate to sonic booms and that long-term effects are not adverse. Captive and free-ranging ungulates exhibited a startle response and increased heart rates upon initial exposure to a sonic boom and decreased response with succeeding exposures suggesting habituation (Workman *et al*. 1992). In raptors, Ellis *et al*. (1991) found that peregrine and prairie falcons' responses to simulated sonic booms were often minimal and never associated with reproductive failure. Typically, birds quickly resumed normal activities within a few seconds following a sonic boom. While the falcons were noticeably alarmed by the sonic booms, the negative responses were brief and not detrimental to reproductive success during the course of the study. Sonic boom levels and frequency of occurrence are slightly higher than baseline levels, therefore, potential impacts to wildlife from sonic booms would be minimal.

Special-Status Species

No federally-listed plant species are known to occur on the ranges. Some populations of sensitive plant species or species of concern (see Appendix E) are found on the ranges, but not within existing target areas. Existing threats to populations of sensitive plant species on the ranges include ordnance delivery and the use of flares. Threats to these plant populations are minimal, since ordnance delivery activities are restricted to existing target areas, therefore, impacts to sensitive plant species found on the ranges would be limited, if any.

According to the USFWS Biological Opinion that reviewed the potential impacts to desert tortoise populations on Ranges 62, 63, and 64, "…current weapons testing and training is not likely to jeopardize the continued existence of the desert tortoise, and is not likely to destroy or adversely modify designated critical habitat." The USFWS issued a number of reasonable and prudent measures, with their implementing terms and conditions, which are designed to minimize incidental take that might otherwise result from current weapons testing and training (USFWS 1997).

The only federally-listed species occurring on the ranges that may be affected by noise is the desert tortoise. Studies on the effects of subsonic noise on desert tortoises have found impacts to be insignificant (Bowles *et al*. 1996). Subsonic noise levels associated with the proposed action are similar to those under baseline conditions and are within normally acceptable criteria. Since there is essentially no change, the proposed action would not result in increased impacts to special-status species from subsonic noise.

Supersonic flight would occur in airspace over desert tortoise populations. As with other wildlife found under MOAs, the greatest effect of military overflights on special status species is from the visual effect of the aircraft and its associated noise. Visual impacts are expected to be minimal because most South Range and MOA operations will take place at altitudes above 5,000 feet AGL, which is higher than the level accounting for most reactions by wildlife to visual stimuli (Lamp 1989; Bowles 1995).

4.10.2 No-Action Alternative

Under the no-action alternative, no impacts to biological resources would occur that are associated with the F-35 beddown; no new construction on the base nor F-35 testing and training operations in NTTR would be conducted. Impacts to biological resources that could have been generated under the F-35 basing action would not occur if the no-action alternative were adopted.

4.11 CULTURAL RESOURCES

Procedures for assessing adverse effects to cultural resources are discussed in regulations for 36 CFR Part 800 of the NHPA. An action results in adverse effects to a cultural resource eligible to the National Register when it alters the resource characteristics that qualify it for inclusion in the register. Adverse effects are most often a result of physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's eligibility; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or transfer, lease, or sale of the property. In the case of the proposed action, potential effects to cultural resources could result from ground-disturbing activities associated with construction or demolition of significant structures, from modification of significant structures, from increased noise levels and vibrations, visual intrusions from overflights, and effects from ordnance and flare use.

4.11.1 Proposed Action

Nellis AFB

Archaeological Resources

Construction and demolition of structures would primarily take place near the flightline in Area I. All of Nellis AFB has been surveyed for archaeological resources. Construction that is not yet sited would be placed in areas that do not contain National Register-eligible archaeological sites. One National Register-eligible archaeological resource does exist on base, but would be avoided by construction or demolition activities. If an unanticipated discovery of archaeological materials occurs during construction, then an investigation and evaluation will be conducted according to procedures in 36 CFR Part 60 and the Nellis AFB ICRMP (Air Force 2010).

In addition to construction and demolition on base, the addition of 36 F-35 aircraft would expand the areas outside and adjacent to Nellis AFB subject to noise equal to or greater than 65 dB DNL by 2020. The effects of noise on archaeological resources may be related to setting. Noise that affects setting may be caused by construction and maintenance of facilities and by machinery or vehicles or by aircraft noise and overflights. To be adversely affected, the setting of a resource must be an integral part of the characteristics that qualify the resource for listing in, or eligibility for, the National Register. Because of modern development, this would not be the case for any National Register-eligible cultural resources in the area, especially in an urban setting like Las Vegas. For the same reasons, adverse visual effects to National Register-eligible archaeological resources are unlikely. Nellis AFB and adjacent areas are currently used for grazing or are developed, and contain two major highways. Additional noise is unlikely to adversely affect archaeological resources in this area or to affect the existing setting.

Architectural Resources

Although World War II and Cold War era structures have been previously inventoried, a new assessment of Nellis AFB Cold War structures will be completed in 2012. If an infrastructure project would affect a National Register-eligible structure, then procedures in accordance with 36 CFR Part 60, as specified in the Nellis AFB ICRMP for the Section 106 process would be implemented (Air Force 2010). Therefore, F-35 activities on Nellis AFB would not have an adverse effect on National Register-eligible architectural resources.

Studies have established that subsonic noise-related vibration damage to structures, even historic buildings, requires high decibel levels generated at close proximity to the structure and in a low frequency range (USFS 1992; Battis 1983, 1988). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988). A study by Wyle Laboratories (Sutherland 1990) indicated that a large, high-speed aircraft flying directly over a building had less than a 0.3 percent chance of damaging fragile structures such as wooden buildings. In other words, an aircraft operating at 200 feet AGL, at 540 knots true airspeed, directly over such a structure is extremely unlikely to cause damage. Operations at higher altitudes would have a lower potential for causing damage as on-the-ground noise levels decrease as the aircraft's elevation rises. Structures offset from the flight track have an even lower probability of being affected by low-flying aircraft. Therefore, historic structures or Cold War-era structures are also unlikely to be affected by noise and vibrations by overflights since noise levels (SEL) from the F-35 would not exceed 110 dB.

Traditional Cultural Properties

No traditional cultural properties are known to occur on Nellis AFB; therefore, impacts to this resource are unlikely.

Nevada Test and Training Range

Archaeological Resources

Ordnance delivery would take place on existing target complexes on NTTR under the proposed action. Similar ordnance is currently being used at these target areas and delivery of additional ordnance by F-35 aircraft would not increase disturbed areas near targets. F-35 use of ordnance on existing targets would be unlikely to adversely affect National Register-eligible archaeological resources.

Architectural Resources

Subsonic noise within NTTR would increase from a maximum of 63 DNL to 65 DNL (251,840 and 351,840 sortie-operations, respectively) in R-4807 and from a maximum of 66 to 67 dB DNL (again in a portion of R-4807). Therefore, no adverse impacts to cultural resources are expected from increased subsonic noise associated with the beddown of F-35 aircraft at Nellis AFB.

It is possible for sonic booms to adversely affect some cultural resources. Individual sonic booms vary considerably. The average boom pressure on the ground is 1 pound per square foot (psf). Maximum overpressures of even 6 psf have an extremely low potential to damage structures or displace rocks (Battis 1983). Therefore, while there is some potential for sonic booms to cause damage in historic buildings, there is very low potential for structural damage to architectural resources or for displacement and breakage of the components of most archaeological resources.

Supersonic noise levels would increase little under the proposed action. Frequency of sonic booms expected with the F-35 would also increase slightly by 1 to 2 booms per month in all airspace units except for the Elgin MOA, where it would increase 4 booms per months under 351,840 sortie-operations. Supersonic flight is currently restricted over Caliente, R-4808, and Highway 168 in the southeastern section of the Desert MOA and this restriction would remain unchanged for the proposed action. Potential effects from sonic booms include audible intrusions to traditional resources and vibration effects to historic structures and rock art sites. There is very low potential for structural damage to architectural resources due to sonic booms. Therefore, no adverse effects to architectural resources are expected due to an increase in supersonic noise levels or frequency of sonic booms.

Traditional Cultural Properties

An increase in sonic boom frequency could adversely affect traditional use or sacred areas by creating an audible intrusion to the setting; however, previous consultations have not elicited concerns. Sonics booms are unlikely to disturb potential traditional cultural properties such as rock art sites. A study was conducted as part of investigations in Civet Cat Canyon on the NTTR at a large rock art site in an overflight zone (White and Orndorff 1999). Native Americans were participants on the field crew and the document was reviewed by the DRC. The research team did not obtain any evidence of impacts from noise. Consultation with American Indian groups would continue through the Native American Program to identify areas of concern and to determine the extent of effects to these resources.

Potential effects to cultural resources from the use of flares are usually associated with the secondary effects of fire. The probability of flares causing fires is usually related to the chances of unexpended flares reaching the ground, the chances of flames igniting vegetation, and the chances of the fire spreading (Air Force 1997a). This continued use would have a negligible, if any, effect on cultural resources.

4.11.2 No-Action Alternative

Under the no-action alternative, there would be no beddown of the F-35 FDE program and WS at Nellis AFB. No buildings associated with the action would be demolished, modified, or constructed on the base and no additional target use or increased noise or sonic booms would occur on NTTR. Therefore, if this alternative were implemented, no impacts generated by the F-35 proposal would occur to archaeological or architectural resources, or traditional cultural properties on the base or under NTTR airspace.

4.12 HAZARDOUS MATERIALS AND WASTE

The qualitative and quantitative assessment of impacts from hazardous materials and waste focuses on how and to what degree the alternatives affect hazardous materials use and management, hazardous waste generation and management, and waste disposal. A substantial increase in the quantity or toxicity of hazardous substances used or generated is considered a potentially significant impact. Significant impacts could result if there would be a substantial increase in human health risk or environmental exposure at a level that could not be mitigated to acceptable levels. A reduction in the quantity and types of hazardous substances would be considered a beneficial impact. If the quantity of hazardous substances used or generated would not change, then there would be no impact.

A comparative analysis of existing and proposed hazardous materials and waste management practices was performed to evaluate impacts. The analysis considered the magnitude of anticipated increases in hazardous waste generation considering historic levels, existing management practices, and storage capacity.

Since changes associated with the proposed action in NTTR would not affect hazardous materials and waste (section 2.5), only potential impacts on Nellis AFB are discussed.

4.12.1 Proposed Action

Hazardous Materials and Hazardous Waste Generation

The hazardous materials and waste associated with the F-35 program would not significantly impact installation management programs. The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. The major differences between the F-35A and legacy aircraft like the F-16, would be the omission of hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer instead of primers containing cadmium and hexavalent chromium currently used for legacy aircraft (personal communication, Luker 2010; Fetter 2008). Management protocols for hazardous substances related to the F-35 would follow existing regulations and procedures because no new type of hazardous materials or hazardous wastes is anticipated with the aircraft beddown.

The most commonly used hazardous materials on the F-35 flightline would include jet and motor fuels, other types of petroleum products, paints, thinners, adhesives, cleaners, lead-acid batteries, hydraulic fluids, and halogenated and non-halogenated solvents. The F-35 hazardous materials program would consist of the following processes: identification and tracking, materials evaluation and materials decision, reporting and documentation, and information dissemination. The hazardous materials program would minimize the quantity and types of hazardous materials associated with the F-35. Ozone-depleting

substances would be eliminated. The use of cadmium would be minimized and other substances such as volatile organic compounds, isocyanates, and chrome would be reduced. Efforts would continue to minimize the use of methyl ethyl ketone (a toxic solvent) and methylene dianiline (used in adhesives).

Maintenance activities associated with the F-35 would include corrosion control and painting; aircraft avionics, electrical system, radar, wheel and tire repair; jet engine, fueling system, structural, and navigational/communication repairs; and aircraft washdown. Materials used during these activities would include primers, topcoats, various coatings, solvents, sealants, epoxies, solder, paint and epoxy strippers, adhesives, refrigerants, coolants, hydraulic fluids, cleaners, lubricants, and degreasers.

Other planned maintenance operations would involve minor maintenance for vehicles and equipment associated with the F-35 program. These operations would not differ from those currently performed for vehicles and equipment associated with other aircraft types at Nellis AFB. Petroleum, oil, and lubricants, would be recycled. Substances used for, or resulting from, minor maintenance activities would be stored in small quantities at each facility. Diesel fuel for support vehicles would be stored in existing above-ground storage tanks, and appropriate spill prevention and containment strategies would continue to be implemented. In addition, a spill prevention, control, and countermeasures plan would be implemented, and appropriate spill response equipment would be located on site.

Since no F-35 data are available that are directly applicable to an operational aircraft, based at Nellis AFB, undertaking the FDE and WS missions, hazardous wastes estimates from a similar, single-engine aircraft, the F-16, were used. Estimates show that about 70 percent of the hazardous waste generated by an F-35 would be derived from six processes: aircraft structural maintenance, AGE maintenance, in-squadron maintenance, munitions maintenance, propulsion and test cell, and supply fuels management (Table 4.12-1). Less notable contributions to overall waste generation would come from additional maintenance activities, such as avionics, tire and wheel shops, and the structural sheet metal shop.

Table 4.12-1 Hazardous Wastes Generated by F-16 Maintenance Processes

Maintenance Process	***Pounds per Aircraft per Year***
Corrosion Control	180
AGE	17
In-Squadron Maintenance	30
Munitions Maintenance	62
Propulsion and Test Cell	25
Supply Fuel Management	10
Total	**324**

Source: Final EA for the Proposed Force Structures Changes and Related Action at Cannon AFB, New Mexico, July 1995

Again, using the F-16 for comparison purposes, it can be anticipated that the amount of hazardous waste generated by the F-35 will be less than that of the F-16 (Table 4.12-1 indicates 324 pounds per F-16 are generated). In comparison, data from all 113 Nellis assigned aircraft (HH-60, A-10, F-15C, F-15E, F-16, F-22A) were assessed and the average hazardous waste per aircraft per year was 385 pounds.

After the full complement of 36 F-35s is in place by 2020, F-35 maintenance would generate about 11,664 pounds of RCRA hazardous waste per year (324 pounds per year x 36 aircraft). This would represent a 6 percent increase in total hazardous waste relative to current conditions. No new types of waste streams are anticipated, and this increase would not affect current hazardous waste management protocols or generator status. Nevertheless, if any new waste streams are identified after the production model of the F-35 is finalized, the appropriate transportation, storage, and disposal procedures would be developed. Through recycling and pollution prevention, hazardous waste at Nellis AFB has declined and is anticipated to continue to decline. These procedures would be applied to waste streams from the F-35 and hazardous waste is expected to decline as well.

Construction and maintenance activities associated with the proposed action would require the use of hazardous substances such as petroleum, oil, and lubricants. During construction, use of these substances for fueling and equipment maintenance would have the potential for minor spills and releases. Use of best construction practices would reduce this potential to an insignificant level.

For any personnel associated with the proposed action that may come in contact with these materials, specialized training for handling and disposal of wastes would be available. Aircraft hangars used for F-35s would be similar to the F-22A hangar which does not have floor drains, thus preventing discharges of hazardous substances into sanitary or storm sewer systems. In addition, a Stormwater Pollution Prevention Plan (Air Force 1998b) prepared by Nellis AFB personnel provides methods for the reduction or elimination of pollution in local groundwater sources, should any hazardous materials be inadvertently released.

Adherence to all requirements for hazardous materials storage and use, as well as temporary storage of hazardous wastes, would be monitored under the Air Force's Environmental Safety and Occupational Health Compliance Assessment Management Program.

Asbestos may be encountered as structures are remodeled or demolished to accommodate new F-35 support facilities. It is current Air Force practice to remove exposed friable asbestos and manage other asbestos-containing materials in place, depending on the potential threat to human health. Friable asbestos, if encountered would be removed by licensed contractors and disposed of in a local asbestos-permitted landfill.

4.12.2 No-Action Alternative

Under no-action alternative, Nellis AFB personnel would continue to use hazardous materials in the same manner as present. Hazardous waste generation would continue similar to those described under baseline conditions and existing procedures for the centralized management, procurement, handling, storage, issuing, and disposal of hazardous materials used on base would continue. If needed, spill prevention, control, and countermeasures plans would be updated to address any new procedures.

The no-action alternative includes no specific plans to alter or demolish asbestos-containing buildings. Normal modifications and repairs to such buildings would likely occur as at present. Any asbestos-containing materials encountered during these efforts would be handled under existing rules to reduce exposure to, and release of, friable asbestos.

5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 CUMULATIVE EFFECTS

This section provides 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an assessment of the nature between interaction of the proposed action with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

5.1.1 Definition of Cumulative Effects

CEQ regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Recent CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action. The scope must consider other projects that coincide with the location and timetable of the proposed action and other actions. Cumulative effects analysis must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur concurrently or in a similar location. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects.

To identify cumulative effects the analysis needs to address three fundamental questions:

1. Does a relationship exist such that elements of the proposed action might interact with elements of past, present, or reasonably foreseeable actions?
2. If one or more of the elements of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

5.1.2 Scope of Cumulative Effects Analysis

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this F-35 beddown EIS, two affected areas define the geographic extent of the cumulative effects analysis. The first affected area includes Nellis AFB and its vicinity, including its associated airspace. The second affected area defines the horizontal boundaries of NTTR and the vertical boundaries of its overlying airspace. Examination of other actions not occurring within or adjacent to one or both of these affected areas reveals that they lack the necessary interactions to result in cumulative effects.

The time frame for cumulative effects centers on the timing of the proposed action. For the beddown itself, the time frame extends from 2011, when construction would begin, through 2020, when the last F-35s would arrive at Nellis AFB. The effects of implementing the FDE program and WS would continue into the future beyond 2020 because new aircraft commonly remain in the inventory for 25 years or more. Actions occurring beyond the end of the beddown, other than the beddown and its operations, or the continued use of Nellis AFB and NTTR, are not reasonably foreseeable and cannot be considered under cumulative effects.

Past actions within the two affected areas relate predominantly to activities on and use of Nellis AFB and NTTR. Under the no-action alternative, the current environmental conditions of these two areas underwent analysis in this EIS. Since those conditions represent the result of long-term use occurring at Nellis AFB and in NTTR, analysis of the no-action alternative has considered those past and present effects engendered by the operation and use of the base and NTTR. The *Renewal of the Nellis Air Force Range Land Withdrawal Legislative EIS* (Air Force 1999b) for the withdrawal renewal also addressed the effects of the use of NTTR. Previous analyses addressing the Nellis AFB affected area include *Wing Infrastructure Development Outlook (WINDO) EA* (Air Force 2006d), *F-22 FDE and WS Beddown at Nellis AFB, Nevada EIS* (Air Force 1999a), the *Base Realignment and Closure (BRAC) Environmental Assessment for Realignment of Nellis Air Force Base* (Air Force 2007b), and the *Nellis and Creech Air Force Bases Capital Improvements Program Environmental Assessment* (Air Force 2008).

The FDE program and WS beddown EIS also has assessed the interactions, or synergistic effects, of individual elements of the proposed F-35 beddown under each resource (sections 4.2 through 4.12). For example, analyses considered the combined effects of construction and increased aircraft operations on the air quality within the affected region of Nellis AFB and NTTR (section 4.4).

Another factor influencing the scope of cumulative effects analysis involves identification and consideration of other actions. Beyond determining that the geographic scope and time frame for the actions interrelate with the proposed action, the analysis employs the measure of “reasonably foreseeable” to include or exclude other actions. For the purposes of this analysis, public documents prepared by

federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Scoping also can provide insight into such actions, but no comment received at scoping for this EIS identified other such actions. Documents used to define other actions included notices of intent for EISs and EAs, management plans, land use plans, other NEPA studies, and economic and demographic projections.

5.1.3 Cumulative Effects of Reasonably Foreseeable Actions

Actions potentially relating to the cumulative effects for the proposed F-35 beddown could include those of the DoD, Department of Energy, Department of the Interior, and local counties. The following outlines these actions and assesses their relationship to the proposed beddown.

DoD Past, Present, and Future Actions

Nellis AFB is an active military installation that undergoes continuous change in mission and in training requirements. This process of change is consistent with the United States defense policy that the Air Force must be ready to respond to threats to American interests throughout the world. Several recent mission and training requirements have resulted in facility construction and upgrades on the NTTR.

Nellis AFB. The Air Force is implementing a Wing Infrastructure Development Outlook (WINDO) program of infrastructure improvements through 2008. The proposed action consisted of 631 WINDO projects at Nellis AFB (the majority of projects occur within the base environs), NTTR associated facilities, Creech AFB, and Tonopah Test Range that include repair, maintenance, infrastructure installation, renovation, construction, and demolition. Air Force analysis of the impacts of implementing these WINDO projects resulted in a Finding of No Significant Impact (Air Force 2006d). In 2008, the Nellis and Creech Air Force Bases Capital Improvements Program Environmental Assessment evaluated adjustments to the planning process based on any changes in mission requirements or identified gaps in capabilities. This reevaluation under EIAP analyzed direct, indirect, and cumulative impacts and resulted in a Finding of No Significant Impact.

The 2005 DoD BRAC recommended realignment of aircraft for Nellis AFB; the base could gain up to eight fighter aircraft. This realignment began in late 2007 with the Air Force completing the EIAP in March 2007 (Air Force 2007b). On base, there will be administrative, operational, instructional, flightline, and infrastructure upgrades and construction disturbing 49 acres from 2007 to 2011. There would also be a 3 percent increase in annual airfield operations of roughly 1,400.

NTTR. In 2002, the Air Force approved construction of the military operations in urban terrain (MOUT) facility encompassing approximately 97 acres at Silver Flag Alpha Complex on Range 63A with facilities constructed at Creech AFB. Construction of the MOUT began in 2002 and is complete. In 2003, construction of a High Technology Training Complex (HTTC) encompassing 946 acres on Range 62 was approved by the Air Force (Air Force 2003b). Construction of the HTTC began in 2004 and concluded in 2008.

In 2003, the Air Force implemented a force structure change that will add up to 48 medium- and high-altitude (MQ-1 and MQ-9) Predator unmanned aerial vehicles to the current inventory of 40 Predators at Creech AFB and add 143 personnel to Nellis AFB. Construction and infrastructure improvement projects related to the Predator force structure are complete. The Air Force prepared an EA for the *Predator Force Structure Changes at Indian Springs Air Force Auxiliary Field* in 2003. This analysis revealed minimal impacts and the Air Force adopted a Finding of No Significant Impact. In addition, a number of other actions has been analyzed previously in the *Renewal of the Nellis Air Force Range Land Withdrawal Legislative EIS* (Air Force 1999b) and when evaluated with the proposed F-35 beddown would not generate additive cumulative effects to the region.

Currently, components of the ExpeRT course occur at Silver Flag Alpha on NTTR and at nearby Creech AFB. Under the proposed action, the Air Force is increasing the number of students training by the Security Forces from an existing 2,520 students per year to 6,000 students per year at the end of the fourth phase of implementation in the winter of 2008. To support this increase, the Air Force is providing infrastructure improvements (a laundry/shower/latrine, leach field, water storage tanks, and communication, water, and power lines) to existing tent complex, MOUT training site, and other facilities; upgrade five existing small-arms training ranges; construct two academic facilities; and provide for a Convoy Combat Training route on existing road A-1—all on Silver Flag Alpha. Although training would continue and increase at both Creech AFB and Silver Flag Alpha, this action did not involve any new construction or upgrades of facilities at Creech AFB.

Under the BRAC realignment (2005), sortie-operations increase, as well as a minor uptake in use of munitions, chaff, and flares; no infrastructure, facilities, or ranges would need to be constructed, demolished, or renovated. Again, the total amount of activity (less than 1 percent of existing levels) is minimal in context with overall NTTR use.

DOE Past, Present, and Future Actions

No DOE actions will incrementally impact Nellis AFB and NTTR. Funding for the Yucca Mountain project was eliminated in the FY11 budget request. DOE has reversed its application to license the facility and is now in the process of closing down the site by September 30, 2011.

Department of Interior Past, Present, and Future Actions

BLM. The BLM manages millions of acres of public lands in southern Nevada which include portions of land underlying NTTR and areas near Nellis AFB. Management of the multiple-use public lands requires continued updating and changes to area resource management plans to maintain land use flexibility while protecting sensitive species. The F-35 proposal would be a continuation of the military mission and would not affect BLM land management in areas in the vicinity of the base or underlying NTTR airspace. Therefore, cumulative impacts would not change from existing conditions or environmental consequences presented in this EIS.

USFWS. Aircraft operate in airspace overlying the DNWR and employ ordnance within DNWR lands approved for such activity in accordance with a Letter of Agreement between the Air Force and the USFWS. Beddown of the F-35s and their use of NTTR airspace would not change the nature of overflights that the DNWR currently experiences or negligibly increase the use of the ranges within DNWR boundaries. Cumulative impacts; therefore, would not change from the existing conditions or environmental consequences presented in this EIS.

Local Actions

Nellis AFB, North Las Vegas, and a portion of NTTR lie within Clark County, whereas the majority of NTTR resides mostly in Nye and Lincoln counties. Census data and other information indicate that Clark County exhibited a 38 percent increase in population from 2000 to 2009 (compared to a 32 percent experienced by the state) (USCB 2010b). It is anticipated that home construction will continue throughout the Las Vegas Valley; that the highway network will continue to grow and be upgraded; and that air service will be expanded. To accommodate the growth, the FAA and BLM announced their intent to construct and operate a new supplemental commercial service airport 30 miles south of Las Vegas (the Ivanpah Valley Airport), along I-15, to alleviate congestion and delays at McCarran International Airport (SNSA 2007). While still in the impact analysis process, the potential increase and/or change in airspace use could cumulatively impact NTTR airspace.

5.2 ASSESSMENT OF CUMULATIVE EFFECTS BY RESOURCE AREA

Analysis of the F-35 proposed action, when considered cumulatively with past, present, and/or future actions, resulted in a finding of no adverse and/or significant impacts to noise; safety; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; biological resources; and hazardous materials and waste:

- *Noise*. The additional sorties at Nellis AFB and NTTR from the BRAC action would constitute a 3 percent and less than 1 percent increase in the airfields and airspace, respectively. This increase

would not change noise levels as presented in section 3.4. No other actions by the DOE, Department of Interior, or local entities would change the noise environment at Nellis AFB or NTTR as presented in section 4.4. The proposed new Las Vegas area airport is more than 30 miles south of the base and would not impact noise levels around the base or in NTTR airspace.

- *Safety*. None of the other actions would change safety procedures within the base or on NTTR lands or vice versa. DOE and Air Force safety procedures are already prescribed through existing operating agreements; no new operating safety procedures would be required under the F-35 beddown proposal, therefore, no BLM or USFWS safety regulations or procedures would be impacted by Air Force activities at Nellis AFB or NTTR.

- *Land use and recreation*. Land use impacts should not differ from those presented in section 4.6. The increase in noise levels due to the F-35 beddown could impact land uses but this level of impact would not differ when considered cumulatively with the other actions. This would also be true in lands underlying NTTR airspace. There would be an increase in subsonic and supersonic noise levels but no further increase to these noise levels are anticipated when considered with the other actions.

- *Socioeconomics and infrastructure*. When considered cumulatively, the F-35 socioeconomic impacts would be negligible when compared to impacts associated with the growth that Las Vegas Valley is currently experiencing. Input to the economy will continue to increase but would not be adverse when considered with the F-35 action. This would be the same for infrastructure impacts. Those proposed by the F-35 beddown are overshadowed by the road, public services, and utility upgrades and construction associated with the Las Vegas urban area population growth and would not incur adverse impacts when considered incrementally with these other actions.

- *Environmental justice and protection of children*. Impacts would not differ for minority or low-income populations than what are presented in section 4.7 of this EIS. No other projects, when considered cumulatively, would disproportionately impact these populations (as well as the potential risk to children) around Nellis AFB or under NTTR airspace. No adverse incremental impacts are anticipated.

- *Biological resources*. Impacts to biological resources in the vicinity of Nellis AFB and NTTR would not differ noticeably from those presented in section 4.10. For the most part, developed land within Nellis AFB would be disturbed and would not adversely impact threatened and/or endangered species or habitat supporting these species. Therefore, it is not anticipated that when considered cumulatively with the other actions, biological resources would be adversely impacted. The same can be said for biological resources associated with NTTR. Other projects proposed at the DOE and the Department of Interior levels are coordinated through consultation

processes already in place with the Air Force; therefore, no impacts are anticipated when considered cumulatively to biological resources.

- *Hazardous materials and waste*. No new hazardous materials (other than those already used and managed at Nellis AFB) would be introduced at Nellis AFB; therefore, when considered with other hazardous material activities on the base, it is anticipated that there would be no cumulative effects anticipated. In terms of hazardous waste, no new waste streams would be created from basing the F-35 at Nellis AFB. Therefore, it is not anticipated that there would be any impacts to hazardous waste management and disposal when considered incrementally with other on-base activities. No other actions within NTTR, when considered with F-35 operations, would change hazardous material and waste management and disposal at the ranges; therefore, no impacts.

Following evaluation of the F-35 proposed action and other actions cumulatively, potential effects on airspace and aircraft operations; air quality; soils and water; and cultural resources were studied, the results of which are presented below.

Airspace and Aircraft Operations. The proposed action would increase the number of aircraft operations at Nellis AFB and within NTTR airspace; however, operations would remain within the historical range for both the airfield and NTTR. Development of the Ivanpah Valley Airport would expand operations in the Las Vegas terminal airspace but should not have an adverse effect on airspace and aircraft operations at Nellis AFB or NTTR due to both the ongoing consultation process associated with the supplemental airport proposal as well as following existing rules and regulations of the FAA and Air Force. Programs, policies, procedures, and manuals are already in place to ensure safe airfield operations and flight safety.

The FAA has designated Nellis AFB as Class B airspace that requires all aircraft operating within the lateral and vertical limits of this area to be in communication with and under the positive control of an air traffic control facility to maximize the safe, orderly flow of all aircraft operating within this congested area. In NTTR, FAA airspace designations allow the Air Force full control to ensure the safe operation of military, commercial, and civilian air traffic within these airspace units. In summary, the potential air operations and flight safety impacts are not expected to be significant when considered cumulatively with the other actions. This would be assured by following established Nellis AFB and NTTR operating procedures, conducting all flight operations in compliance with existing regulations and restrictions, and through continued coordination between the FAA and Air Force regarding operations within these airspace units.

Air Quality. The air quality environment for Nellis AFB is the Las Vegas Valley, and Las Vegas is in nonattainment status CO (serious), PM_{10} (serious), and 8-hour ozone (basic). The F-35 proposed action will require facility construction and additional airfield operations that would increase emissions to the regional area and these impacts are presented in section 4.3. The F-35 proposed action exceeds

de minimis thresholds for CO and the ozone precursor pollutants NO_x in 2020. This could impact regional air quality and other actions in the local area and population growth. The Air Force has coordinated with Clark County to include 185 tons of NO_x emissions into their Ozone SIP Revision. Clark County has responded positively to this request (see Appendices D and F) as for CO emissions, the county has already accounted for those CO exceedances in their CO SIP Revision. Clark County will continue to regulate air quality to ensure that emissions in do not exceed their budgeted levels and will continue to do so into the foreseeable future. Therefore, it is anticipated that while overall regional emissions would increase on a cumulative basis, the proportion added by the F-35 beddown would not adversely impact Clark County regional air quality or attainment/maintenance status.

In terms of GHG emissions, assuming a lifespan of 28 years for each aircraft and unchanged operational tempo, the total GHG emissions over the course of the lifespan for all 36 aircraft based at Nellis AFB would total 3,395,644 metric tons.

Soils and Water. Soil impacts include soil loss and erosion. Several factors indicate that erosion and soil loss would be negligible on Nellis AFB: precipitation in the Nellis AFB/Las Vegas area is low, construction would take place over a 5-year period, most construction would occur on previously developed land, and Air Force and Clark County require employment of standard construction practices to minimize erosion and stormwater run-off. Overall, the proposed action would result in no potential for incremental adverse impacts from proposed F-35 activities and no adverse impacts to soils when considered incrementally with other on-base actions.

In terms of water use, Nellis AFB is currently allotted about 7.1 million gpd of combined surface and groundwater sources, and full implementation of the proposed action in 2020 would result in use of approximately 355,180 gpd to 446,419 gpd, which is well within Nellis AFB’s water allocation. When considered with other on-base actions, there would not be a negligible increase in water use to require the base to increase their existing water rights. It is unlikely, therefore, that the cumulative effects of the proposed action would have significant adverse effect on water resources at Nellis AFB and in the surrounding area. Soils and water resources within NTTR would not be impacted because no construction or operational ground disturbance activities would occur in the ranges under the F-35 beddown; therefore, no impacts would occur cumulatively when considered with other actions.

Cultural Resources. Potential effects to cultural resources could result from ground-disturbing activities associated with construction or demolition of significant structures, from modification of significant structures, from increased noise levels and vibrations, visual intrusions from overflights, and effects from ordnance and flare use. All of Nellis AFB has been surveyed for archeological resources. Only one National Register-eligible archaeological site, a quarry, exists on base. All other sites were determined through SHPO consultation to be ineligible for nomination. If an unanticipated discovery of archaeological material occurs during construction, then an investigation and evaluation would be

required and conducted according to procedures in 36 CFR Part 60 and the Nellis AFB ICRMP (Air Force 2010). In addition, no National-Register eligible architectural resources would be affected by this proposed action and as a result of Air Force efforts to address cultural and Native American laws, no traditional cultural properties have been identified on Nellis AFB and therefore would not be impacted.

A cultural resource setting may be impacted by maintenance activities, machinery and vehicle use, or by aircraft overflights. To be adversely affected, the setting of a resource must be an integral part of the characteristics that qualify the resource for listing on, or eligibility for, the National Register. Because of modern development on and around the base, neither the setting nor visual aspect would be affected by the proposed action on Nellis AFB. Additional noise, also, is unlikely to adversely impact resources at the base. Nellis AFB cultural resources, therefore, would not be adversely impacted when considered in conjunction with other on-base actions.

On NTTR, no potentially-eligible or eligible archaeological sites or architectural structures would be cumulatively affected because no new construction, demolition, or upgrade activities would occur due to the F-35 proposal. Ordnance delivery by the F-35 would occur on existing target complexes on NTTR, with similar ordnance to that currently being used at these target areas. No new disturbance areas or change of ordnance are projected when considered with other actions. Use of ordnance on existing targets would be unlikely to adversely affect National Register-eligible archaeological resources.

In the overlying NTTR airspace, impacts from overflights would require high decibel levels, generated at close proximity to the structure, and in a low frequency range to create noise-related vibration damage to structures, even historic buildings (USFS 1992; Battis 1983, 1988). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988). Even a direct overflight of a fragile structure by a large, high-speed aircraft has less than a 0.3 percent chance of damage (Sutherland 1990). Operations at higher altitudes have an even lower probability of being affected by aircraft overflights. Historic structures are unlikely; therefore, to be adversely affected by noise and vibrations by overflights since subsonic noise levels (SEL) from the F-35 would not exceed 110 dB and would not perceptibly increase when considered with other projects that would occur in NTTR airspace.

Frequency of sonic booms expected with the F-35 would increase booms per month in some airspace units and their impact to cultural resources is presented in section 4.12. The characterization of these impacts would not change when considered cumulatively with other actions in NTTR airspace. An increase in sonic boom frequency could adversely affect traditional uses or sacred areas by creating an audible intrusion to the setting; however, government-to-government consultations have not elicited concerns. The effects to cultural resources from the use of flares is usually associated with the secondary effects of fire, and to date, have little, if any impact on cultural resources. Continued flare use would have a negligible cumulative effect on cultural resources. Consultation with American Indian groups

would continue through the Native American Program to identify areas of concern and to determine the extent of effects to these resources. In summary, no adverse impacts to cultural or traditional resources are anticipated with NTTR when considered cumulatively with other actions within the same area.

5.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA requires that environmental analysis include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resource and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

For the proposed action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting but negligible. Those limited resources that may involve a possible irreversible or irretrievable commitment under the proposed action are discussed below. Facilities construction and maintenance for F-35 support would require consumption of limited quantities of aggregate, steel, concrete, petroleum, oil, and lubricants. Construction would occur on previously disturbed areas or locations lacking native habitat, so no irreversible loss of habitat and wildlife would result. Similarly, construction on base would avoid significant cultural resources. While construction of new facilities would incur some soil disturbance and loss, measures to localize and minimize soil loss would be implemented.

The proposed F-35 beddown would require fuels used by aircraft and surface vehicles. The additional sorties from Nellis AFB would result in fuel use for as long as the F-35 FDE program and WS continued. Surface vehicles supporting F-35 maintenance and operations would also use fuel, oil, and lubricants. However, since the mandated FDE program and WS would need to occur at some location, use of these finite resources would be inevitable.

Personal vehicle use by the staff proposed to support the F-35 beddown would consume fuel, oil, and lubricants. The amount of these materials would not perceptibly change from that currently used by these individuals and their families at Nellis AFB and would not increase overall consumption of these resources. Ordnance use would cause negligible ground disturbance, soil exposure, and erosion. Existing targets will be used for F-35 training so new disturbance would be likely. In addition, quantities of steel and other materials used in construction of munitions and targets would be committed under the proposed action.

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6.0 REFERENCES CITED

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Williams, Vincent. Chief, Fire Emergency Services, 98 SPTS/ISF. Indian Springs AFAF. 2005.

8.0 LIST OF PREPARERS AND CONTRIBUTORS

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James Campe, *Senior Environmental Analyst*
B.S., Naval Architecture and Offshore Engineering, University of California, CA, 1986
Years of Experience: 18

Christina Cummings, *Production Coordinator*
A.A.S., Administrative Office Technology, Boise State University, ID, 1999
Years of Experience: 12

Cathy Doan, *Airspace and Aircraft Operations*, *Safety, Hazardous Materials and Waste*
B.S., English, Central Michigan University, MI, 1980
M.A., Human Resources Development, Webster University, MO, 1985
Years of Experience: 15

Travis P. Gahm, *GIS Specialist*
B.S. Biology, James Madison University, VA, 2009
Years of Experience: 2

Lesley Hamilton, *Air Quality*
B.A., Chemistry, Mary Baldwin College, VA, 1988
Years of Experience: 17

Chareé D. Hoffman, *Socioeconomics and Infrastructure, Soils and Water, Biological Resources*
B.S., Biology, Christopher Newport University, VA, 1999
Years of Experience: 7

Edie Mertz, *Graphics*
A.A. General Education, Cerro Coso College, CA, 1994
Years of Experience: 18

Kevin J. Peter, *Project Manager*
B.A., Anthropology, Pomona College, CA, 1975
M.A., Anthropology, Washington State University, WA, 1986
Years of Experience: 24

Kathy L. Rose, *Public Involvement, QA*
B.A., Political Science/German, University of Massachusetts/Amherst, MA, 1980
M.A., International Relations, George Washington University, DC, 1983
M.S., Forest Resource Management, University of Idaho, ID, 1996
Years of Experience: 22

Teresa Rudolph, *Land Use, Recreation and Visual Resources, Cultural Resources*
B.A., Anthropology, Florida State University, FL, 1975
M.A., Anthropology, Southern Illinois University, IL, 1981
Years of Experience: 23

Subcontractors

Joe Czech, Wyle Laboratories, Inc., *Noise*
B.S., Aerospace Engineering, California State Polytechnic University Pomona, CA, 1988
Professional Engineer, State of California, Mechanical, M28245
Years of Experience: 21

Patrick Kester, Wyle Laboratories, Inc., *Noise*
B.S., Mechanical Engineering, California State Polytechnic University Pomona, CA, 2006
Years of Experience: 3

9.0 LIST OF REPOSITORIES

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Repository	Address	City	State	Zip	Phone
Alamo Branch Library	100 North 1st Street	Alamo	NV	89001	775-725-3343
Beatty Library District	400 North 4th Street	Beatty	NV	89003	775-553-2257
Boulder City Library	701 Adams Blvd	Boulder City	NV	89005	702-293-1281
Caliente Branch Library	100 Depot Avenue	Caliente	NV	89008	775-726-3104
Nevada State Library and Archives Federal Publications	100 N. Stewart Street	Carson City	NV	89701	775-684-3360
James Dickinson Library	4505 Maryland Parkway	Las Vegas	NV	89154	702-895-3011
Las Vegas Library, Reference Department	833 Las Vegas Blvd North	Las Vegas	NV	89101	702-507-3500
North Las Vegas Library District Main Branch	2300 Civic Center Drive	North Las Vegas	NV	89030	702-633-1070
Pahrump Community Library	701 East Street	Pahrump	NV	89048	775-727-5930
Community College of Southern Nevada Library - Cheyenne Campus	3200 E Cheyenne Ave	North Las Vegas	NV	89030	702-651-4000
Business and Government Info. Center/322 - University of Nevada Libraries	1664 N. Virginia Street	Reno	NV	89557	775-784-6945, ext 230
Tonopah Public Library	171 Central	Tonopah	NV	89049	775-482-3374
Lincoln County Library	15 Main Street	Pioche	NV	89043	775-463-6645

10.0 INDEX

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APPENDIX A
PUBLIC PARTICIPATION AND CONSULTATION SUMMARY

APPENDIX A
PUBLIC PARTICIPATION AND CONSULTATION

1.0 INTRODUCTION

This appendix presents a summary of the public participation efforts for implementation of the F-35 Force FDE program and WS beddown at Nellis AFB, NV. Many opportunities have been made available for public participation in the F-35 FDE program and WS beddown EIAP. These include the following:

- scoping sessions and comment period;
- agency notification and consultation; and
- public hearings and comment period.

2.0 SCOPING PROCESS

The scoping period for the F-35 FDE program and WS beddown EIAP took place when the Notice of Intent was published in the *Federal Register* on August 23, 2004 (Attachment A). The closing date for the scoping period was set for October 1, 2004. Although the receipt of public comments is most useful during the early stage of the EIAP, the Air Force stated during the scoping sessions that they would welcome comments throughout the EIS analysis and preparation process.

The Air Force's intent during the scoping process was to provide the greatest level of opportunity for government agencies, special interest groups, and the general public to learn about the beddown proposal and to offer several ways for those interested to express their concerns regarding the proposal. Newspaper advertisements (Attachment B) were placed a week before the meetings (in both English and Spanish) in the following newspapers: *Las Vegas Review Journal, Las Vegas Sun, Nevada Appeal, Lincoln County Record, Pahrump Valley Times*, and *El Mundo* (a Spanish publication) describing the proposal and alternatives. The advertisement provided the time, dates, and locations of the meetings. Public comment was invited in these advertisements as well as at the scoping meetings. Public service announcements for the meetings were made on National Public Radio and aired on local Las Vegas television stations.

These scoping meetings were conducted in an "open house" format to create a comfortable atmosphere for attendees—one in which they could converse individually with Air Force personnel. Attendees were welcomed at the entrance by Air Force representatives. The greeters asked attendees to sign in, distributed factsheets, and directed them to the first display. The NEPA factsheet (Attachment C) was printed in both English and Spanish. Displays were designed to enhance public understanding of the NEPA process and the multi-role F-35, the purpose and need for the proposed action, and the public's role in shaping the proposal.

Attendees were encouraged to examine these displays and to ask any questions they had regarding the information presented. The displays illustrated information regarding the construction, personnel, and flight activities proposed at Nellis AFB and on the number and location of F-35 flight operations proposed for the NTTR. Air Force personnel and AFCEE representatives encouraged attendees to examine the displays and ask questions. They were also encouraged to formulate and submit scoping comments.

The Air Force held five scoping meetings at locations in Nevada that could potentially be affected by the proposed action and in communities that have expressed concerns with NTTR activities. All meetings were held from 6:00 p.m. to 8:00 p.m.; the schedule and location of each meeting is provided in the table below.

Schedule of Meetings, Attendance, and Comments				
City/Town	***Date***	***Location***	***Attendees***	***Comments***
Carson City	Monday, September 13	Plaza Hotel 801 S. Carson Street	4	0
Alamo	Tuesday, September 14	Lincoln County Annex 100 South First West Street	15	3
Pioche	Wednesday, September 15	Pioche Town Hall Hinman and Main Streets	4	1
Pahrump	Thursday, September 16	Bob Ruud Community Center 150 N. Highway 160 – Room B	4	0
Las Vegas	Friday, September 17	Hollywood Recreation Center 1650 S. Hollywood	13	5

During the official scoping period ten total comment sheets or letters were received. Nine sheets (with several comments on each) at the scoping meetings and a letter from the Nevada State Clearinghouse with comments from the SHPO and Nevada Department of Wildlife. The SHPO indicated that once specific information is known about flight patterns and construction, it should be notified so that it can determine the potential for adverse impacts to religious, cultural, and historic properties. The Department of Wildlife expressed concern for: 1) sensitive mesquite/acacia plant communities that support a Neotropical migrating bird (*Phainopepla nitens*); 2) burrowing owls; and 3) kit fox (a state-protected species).

Three comment sheets addressed the concern with sonic booms—the number, severity, potential for structure (i.e., window) damage, and human disturbance. In Carson City, two attendees verbally (i.e., no written comments were received) expressed a concern for potential low-altitude flight conflicts over areas being considered for wind generation development under NTTR airspace. One commentor in Pioche observed that early morning flights, in airspace over the central portion of NTTR, during the fall hunting season appeared to scare deer. In Alamo, one commentor asked if a restricted area could be created over the town.

Three commentors in Las Vegas stated their appreciation for the Air Force; one commentor asked how the current noise will compare with the new F-35 (taxi, take-off, and landing) and asked if the F-35s will be used in the same way at the range (e.g., flights per day, how low, how fast). Another commentor expressed the following concerns: 1) noise, 2) radar interference, 3) safety (suggested creating a buffer zone around the residential area to the east), and 4) EPA results.

With the exception of Pahrump, media representatives were present at all meetings and in Las Vegas, Channel 3 (NBC affiliate) sent a reporter and cameraman to interview Air Force representatives and members of the public.

3.0 INTERAGENCY-INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING (IICEP)

As part of the EIAP, consultation and correspondence was performed with several state and federal agencies. That correspondence included the following:

U.S. Fish and Wildlife Service (USFWS):
Memorandum from HQ ACC/CEPP to USFWS, State Supervisor, Reno Office, August 12, 2004

Nevada Department of Wildlife (NDOW)
Memorandum from HQ ACC/CEVP to NDOW, Reno Headquarters, August 12, 2004

Nevada State Historic Preservation Officer (SHPO)
Memorandum from HQ ACC/CEVP to SHPO, August 12, 2004

Native American Interaction Program
Memorandum from Nellis AFB on August 12, 2004, to:
Moapa Band of Paiutes
Timbisha Shoshone Tribe
Duckwater Shoshone Tribe
Big Pine Paiute Tribe of the Owens Valley
Kaibab Band of Southern Paiutes
Fort Mojave Tribe
Pahrump Paiute Tribe
Yomba Shoshone Tribe
Colorado River Indian Tribes
Las Vegas Paiute Tribe
Lone Pine Paiute Shoshone Tribe
Las Vegas Indian Center

Timbisha Shoshone Tribe
Ely Shoshone Indian Tribe
Benton Paiute Indian Tribe
Chemehuevi Indian Tribe
Paiute Indian Tribes of Utah
Bishop Paiute Indian Tribe
Fort Independence Indian Tribe

Copies of the correspondence are presented at the end of this appendix (Attachment D).

4.0 PUBLIC HEARINGS AND COMMENTS

The public comment period for the F-35 FDE program and WS beddown Draft EIS began when the Notice of Availability is published in the *Federal Register* on April 4, 2008. The public comment period extended for 45 days from that date.

Advertisements announcing the hearings was placed in the same local newspapers used to announce the scoping meetings (see above). Public service announcements were aired on regional radio stations. The proposed format for the public hearings combined the formal hearing approach with the open house format. Prior to formal public testimony, a brief summary of the environmental process and the F-35 FDE program and WS beddown proposal and EIS analysis was presented by Air Force personnel. In addition, displays were staffed by Air Force personnel to answer any questions the public had regarding the analysis presented in the EIS.

Public hearing attendees were greeted by Air Force representatives at the door where the registration table was positioned. Attendees were asked to write their name and address on the registration sheet. If they chose to testify, they were asked to complete a speaker card with this same information. They were also offered fact sheets and any other relevant written materials describing the F-35 beddown proposal and EIS analysis. Two methods of commenting were available for people attending the public hearings:

1. oral comments recorded by a court reporter and/or
2. written comments, either brought with them or completing a comment form provided by the Air Force.

The Air Force held hearings in Las Vegas, Caliente, and Alamo, NV.

ATTACHMENT A

Notice of Intent

DEPARTMENT OF DEFENSE
Department of the Air Force

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL PERMANENT BEDDOWN AT NELLIS AFB, NEVADA

AGENCY: Air Combat Command, United States Air Force.

ACTION: Notice of intent.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989), the Air Force is issuing this notice to advise the public of its intent to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of stationing F-35 tactical fighter aircraft at Nellis Air Force Base (AFB), Nevada.

A total of 36 F-35 aircraft would be permanently based at Nellis AFB in support of the Force Development Evaluation (FDE) mission and the United States Air Force Weapons School (USAFWS). The FDE mission is to test and evaluate state-of-the-art weapons systems and develop leading-edge tactics to improve the future combat capability of Air Force aerospace forces. The USAFWS mission is to teach graduate-level instructor courses, which provide advanced training in weapons and tactics employment to officers of the combat air forces. The beddown would occur in phases between the years 2009 and 2028. The proposed action would also include facility construction on Nellis AFB to be accomplished over a 3-year period, beginning in fiscal year 2007. The Air Force will consider all environmental issues supporting the beddown, however, the Air Force has currently identified air quality and noise as issues requiring detailed analysis.

The Air Force will host a series of scoping meetings to receive public input on alternatives, concerns, and issues to be addressed in the EIS. The schedule and locations of the scoping meetings are as follows:

Monday, September 13, 2004	Carson City Plaza Hotel 801 S. Carson Street
Tuesday, September 14, 2004	Alamo Lincoln County Annex 100 South First West Street
Wednesday, September 15, 2004	Pioche Pioche Town Hall Hinman and Main Streets
Thursday, September 16, 2004	Pahrump Bob Ruud Community Center

	150 N. Highway 160 - Room B
Friday, September 17, 2004	Las Vegas Hollywood Recreation Center 1650 S. Hollywood

The Air Force will accept comments at any time during the environmental analysis process. However, to ensure the Air Force has sufficient time to consider public input in the preparation of the Draft EIS, comments should be submitted to the address below by 1 Oct, 2004.

POINT OF CONTACT: Ms. Sheryl Parker, HQ ACC/CEVP, 129 Andrews St., Suite 102, Langley AFB, VA 23665-2769, (757-764-9334).

NEWS RELEASE

UNITED STATES AIR FORCE

Air Warfare Center Public Affairs
4370 N. Washington Blvd. Suite 223
Nellis AFB, NV 89191-7078
Phone: (702) 652-2750; Fax (702) 652-9838
E-mail: michael.estrada@nellis.af.mil

www.nellis.af.mil/pa/newsreleases.htm

Release No. 04-24
Time: 8 a.m.
Date: Aug. 23, 2004

AIR FORCE ISSUES NOTICE OF INTENT ON THE F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL PROGRAMS AT NELLIS AFB

NELLIS AIR FORCE BASE, Nev. -- The Air Force published today the Notice of Intent in the Federal Register to prepare an environmental impact statement to assess the potential environmental impacts of a proposal to permanently base F-35 aircraft here for the Force Development Evaluation and Weapons School mission.

The F-35 Joint Strike Fighter is designed to complement the F/A-22 and would replace the aging F-16 and A-10 fleets. The first aircraft delivery is scheduled in 2009. The proposal is to base a total of 36 operational aircraft at Nellis by 2028.

The Air Force expects to complete the environmental analysis process in about two years. The environmental impact analysis will examine the issues relating to land use, airspace and safety, air and water quality, noise, socioeconomics, biological and cultural resources, and cumulative actions.

The Air Force will conduct the scoping meetings in mid September at:

--more--

Air Force to hold public scoping meetings on F-35 Force Development Evaluation and Weapons School programs at Nellis AFB

NELLIS AIR FORCE BASE, Nev. -- The Air Force has scheduled a series of public meetings to gather feedback from the public on the environmental process which will help establish a home for the F-35 Force Development Evaluation and Weapons School programs. Public feedback gathered from these meetings will assist the Air Force in defining the scope of analysis in the environmental impact statement.

The scoping period includes scoping meetings at five locations in Nevada to solicit community involvement and feedback for the environmental analysis to support the permanent basing of the F-35 Joint Strike Fighter at Nellis Air Force Base.

The F-35 is the next generation, stealth air-to-ground fighter, designed to complement the F/A-22 and replace the aging F-16 and A-10 fleets. The first aircraft delivery is scheduled in 2009. The proposal is to base a total of 36 operational aircraft at Nellis by 2028. Drawdown of the F-16 and A-10 aircraft at Nellis would begin in 2019.

Public involvement is an essential part of the environmental impact analysis process. With public involvement and detailed environmental analysis, the National Environmental Policy Act process helps the decisionmaker arrive at the best possible informed decision.

The open house scoping meetings will be held from 6:00 p.m. – 8:00 p.m. Air Force representatives will be available to provide information on the proposed action and answer questions and receive comments on the proposal. The schedule for the public scoping meetings is:

-- Carson City, Nev.: Monday, September 13, Plaza Hotel, 801 S. Carson Street

-- Alamo, Nev.: Tuesday, September 14, Lincoln County Annex Building, 100 South First West St.

-- Pioche, Nev.: Wednesday, September 15, Pioche Town Hall, Hinman & Main Streets

-- Pahrump, Nev.: Thursday, September 16, Bob Rudd Community Center, 150 N. Highway 160

-- Las Vegas, Nev.: Friday, September 17, Hollywood Community Center, 1650 S. Hollywood

The environmental impact analysis process will examine issues relating to land use, airspace and safety, air and water quality, noise, socioeconomics, biological and cultural resources, and cumulative actions. The environmental analysis process will be completed in about two years.

-- Carson City, Nev.: Monday, September 13, Plaza Hotel, 801 S. Carson Street

-- Alamo, Nev.: Tuesday, September 14, Lincoln County Annex Building, 100 South First West St.

-- Pioche, Nev.: Wednesday, September 15, Pioche Town Hall, Hinman & Main Streets

-- Pahrump, Nev.: Thursday, September 16, Bob Rudd Community Center, 150 N. Highway 160

-- Las Vegas, Nev.: Friday, September 17, Hollywood Community Center, 1650 S. Hollywood

Comments will be accepted throughout the environmental impact analysis process; however, to ensure sufficient time to consider public and agency comment in preparation of the draft environmental impact statement, comments should be submitted to the address below by Oct. 1, 2004.

AWFC/PA

4370 N. Washington Blvd., Suite 223

Nellis AFB, NV 89191-7078

Attn: Mike Estrada

For more information, contact Mike Estrada at (702) 652-2750.

-30-

The environmental impact analysis process encourages comments and feedback at any time. However, to ensure sufficient time to consider public and agency comments in the screening process and the preparation of the draft EIS, comments should be submitted by October 1, 2004, to:

AWFC/PA
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Attn: Mike Estrada

For more information, contact Mike Estrada at (702) 652-2753.

ATTACHMENT B

Newspaper Advertisements

The ***U.S. Air Force*** announces its intent to prepare an Environmental Impact Statement (EIS) to assess the potential environmental impacts of a proposal to base F-35 Fighter Aircraft at Nellis AFB, NV. A total of 36 F-35 aircraft would be permanently based in phases at Nellis AFB between the years 2009 and 2028. The Air Force will consider the information in the EIS in making the beddown decision and document it in the Record of Decision.

The ***Air Force is holding public scoping meetings*** at the locations below and invites your participation. All meetings will be held in an open house format, and your participation will assist Air Force representatives identify public issues and concerns associated with the F-35 beddown and define the scope of analysis for the EIS. During the open house, the Air Force will be available to describe the proposed action and no-action alternative, define the process involved in preparing the EIS, outline the opportunities for public involvement in the process, and answer questions relevant to the proposal you might have. All **open house meetings will begin at 6:00 p.m. and last until 8:00 p.m**. The open house will be held at the following locations:

City/Town	***Date***	***Location***
Carson City	Monday, September 13	Plaza Hotel, 801 S. Carson Street
Alamo	Tuesday, September 14	Lincoln County Annex, 100 South First West Street
Pioche	Wednesday, September 15	Pioche Town Hall, Hinman and Main Streets
Pahrump	Thursday, September 16	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Friday, September 17	Hollywood Recreation Center, 1650 S. Hollywood

If you are unable to attend one of these open house meetings, you may submit written comments to:

Mike Estrada, Air Warfare Center/Public Affairs Office (AWFC/PA)
4370 N. Washington Blvd., Suite 223, Nellis AFB, NV 89191
For general information, contact Mr. Estrada at: (702) 652-6448

Although we will accept comments throughout the process, we recommend that your scoping comments be sent by October 1, 2004, to ensure equitable consideration in the draft EIS.

La ***Fuerza Aérea de los Estados Unidos*** anuncia su intención de preparar una Declaración de Impacto Ambiental (EIS en inglés) para evaluar los impactos ambientales potenciales de una propuesta para instalar una base de aviones de combate F-35 en Nellis AFB, NV. Un total de 36 aviones F-35 se instalaríán de forma permanente y por etapas entre los años 2009 y 2028. La Fuerza Aérea considerará la información en la EIS para tomar una decisión y la documentará en el Registro de Decisiones.

La ***Fuerza Aérea estará celebrando reuniones públicas de alcance*** en los lugares que se indican a continuación y le invita a participar. Todas las reuniones se harán a puertas abiertas y su participación ayudará a los representantes de la Fuerza Aérea a identificar los temas e inquietudes del público asociados con el asentamiento de los aviones F-35, y definir el alcance del análisis de la EIS. Durante las reuniones, la Fuerza Aérea estará disponible para describir la acción propuesta y la alternativa de no-acción, definir el proceso implicado en la preparación de la EIS, esbozar las oportunidades para que el público se involucre en el proceso y responder a las preguntas relacionadas con la propuesta que pueda tener. Todas las **reuniones a puertas abiertas comenzarán a las 6:00 p.m. y se prolongarán hasta las 8:00 p.m.** Las reuniones se celebrarán en las siguientes ubicaciones:

Ciudad/Población	***Fecha***	***Ubicación***
Carson City	Lunes 13 de septiembre	Plaza Hotel, 801 S. Carson Street
Alamo	Martes 14 de septiembre	Lincoln County Annex, 100 South First West Street
Pioche	Miércoles 15 de septiembre	Pioche Town Hall, Hinman y Main Streets
Pahrump	Jueves 16 de septiembre	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Viernes 17 de septiembre	Hollywood Recreation Center, 1650 S. Hollywood

Si no le es posible asistir a una de estas reuniones a puertas abiertas, usted podrá enviar sus comentarios por escrito a:

Mike Estrada, Air Warfare Center/Public Affairs Office (AWFC/PA)
4370 N. Washington Blvd., Suite 223, Nellis AFB, NV 89191
Para información general, comuníquese con el Sr. Estrada al: (702) 652-6448

Aunque aceptaremos comentarios a lo largo del proceso, le recomendamos que envíe sus comentarios sobre el alcance antes del 1 de octubre de 2004, para asegurar su consideración equitativa en el borrador EIS.

ATTACHMENT C

Fact Sheets

F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement

FACT SHEET

Nellis AFB, NV

September 2004

The Joint Strike Fighter—F-35

The F-35 Joint Strike Fighter aircraft is a multi-role fighter developed to meet the needs of the Air Force, Navy, Marine Corps, and allied air forces. For the Air Force, the aircraft is designed to compliment the F-22 and would replace the aging F-16 and A-10 fleets. Basing (or beddown) of the F-35 aircraft at Nellis Air Force Base (AFB) would provide the Air Force with the capability to meet Force Development Evaluation and Weapons School mission requirements by testing aircraft systems, developing and refining the tactics and maneuvers the aircraft can perform, and training aircrews to fly the F-35 under combat conditions.

Background

The concept for the F-35 aircraft began in the mid-1990s when Department of Defense leadership decided to use the latest jet fighter technology in a common airframe to meet the needs of several branches of the military. Common aircraft design features (e.g., airframe, engine, avionics) will maximize savings making it possible for the Air Force, Navy, and Marines to upgrade their aging aircraft fleets. Components of the Air Force F-35 that distinguish it from the other F-35 variants are an internal gun, infrared sensors, and laser target designator.

When teamed with the air dominance of the F-22, the avionics and stealth of the F-35 are intended to allow the aircraft to penetrate surface-to-air missile defenses to destroy targets.

What's Inside

What is the Proposed Action?

The Air Force proposes to establish the F-35 Force Development Evaluation and Weapons School programs at Nellis AFB, Nevada. The proposal would begin basing F-35 aircraft in fiscal year (FY) 2009 and continue thru FY 2019, for a total of 36 F-35s. Drawdown of the F-16s and A-10s being replaced by the F-35s would start in FY 2019. The proposal would also include construction of F-35 hangar / maintenance units and an aerospace ground equipment facility; aircraft ramp space / parking; munitions storage igloos; operational support facilities; existing facility renovations; and required infrastructure improvements to support the beddown. Construction would begin in FY 2007 and be completed in FY 2013. Personnel changes, resulting in a slight reduction to overall base personnel, would occur from FY 2009 through FY 2028.

Purpose and Need of the Proposed Action

The purpose of the proposed action is to implement the F-35 FDE program and WS at Nellis AFB in response to the United States Congressional determination that the aging Air Force F-16 and A-10 fleets need to be replaced. The Force Development Evaluation program serves several important functions:

- refines employment doctrine and tactics in response to changing threats;
- develops or refines operational procedures and training programs;
- evaluates changes to the aircraft and verifies correction of new deficiencies discovered after system deployment;
- explores non-materiel (e.g., tactics) means of meeting changing operational requirements as long as the aircraft remains in the inventory;
- evaluates routine software changes (operational flight programs), preplanned product improvements, modifications, upgrades, mission data updates, and other improvements or changes as long as the aircraft is in the inventory;
- researches, demonstrates, exercises, analyzes, and evaluates tactics against anticipated threats; and
- ensures proper aircraft performance in combat by providing training, information on operational capabilities, and new requirements.

In addition to the FDE, the Air Force must establish and maintain a WS for each aircraft type in its inventory. This program operates throughout the life of the aircraft, adapting to changes in technology, tactics, and threats. Feedback to and from the FDE program is essential to the WS because it applies, evaluates, and refines tactics developed under FDE. The WS provides up-to-date training for pilots already qualified to fly the aircraft. With tactics and combat training as its focus, the WS offers rigorous, intensive, and realistic instruction that enables WS graduates to effectively teach combat skills to members of their home operational units.

An Overview of the National Environment Policy Act

The National Environmental Policy Act (NEPA) is the national charter for promoting productive harmony between man and the environment and minimizing the impacts of federal actions. This law requires all federal agencies to consider potential environmental impacts in making decisions about those actions. Public involvement is an essential part of the process. Through involving the public and completing detailed environmental analysis, the NEPA process helps the decision-maker arrive at the best possible informed decision.

Informed Decision Making is Crucial

Informed decisions are based on a candid and factual presentation of environmental impacts. The Air Force is visiting communities potentially affected by the proposed action. They are seeking public input into this proposed action as well as seeking any new suggestions the public might have for the proposal to base the F-35 aircraft. To accomplish the EIS, the Air Force will collect data, conduct research, and analyze potential effects of the proposed action on the affected environment. Resources such as airspace management, noise, air quality, and potential effects on biological and cultural resources will be examined. The type and extent of impacts resulting from the proposed beddown will be identified and the degree to which these impacts might potentially affect resources will be analyzed and determined.

The Environmental Impact Analysis Process

The environmental impact analysis process (EIAP) began when the Air Force published a Notice of Intent in the *Federal Register* on August 23, 2004. This Notice announced that the Air Force plans to conduct an environmental analysis for the F-35 beddown. The scoping period also began at that time. Although comments are accepted throughout the environmental impact analysis process, the Air Force encourages submitting them no later than October 1, 2004 to ensure comments can be given full consideration early in the environmental impact analysis process. During the scoping period, preparation of the draft Environmental Impact Statement (EIS) begins. Scoping comments, research, agency and tribal consultation, and various studies contribute to completion of the draft EIS.

Once the draft EIS is completed, it will be published and its availability announced in the *Federal Register* and local newspapers. This initiates the official 45-day comment period. At this time, copies of the draft EIS will be sent to federal, state, and local agencies, American Indian Tribes, and to those citizens expressing an interest in receiving a copy. Public hearing meetings will be held approximately three weeks following the draft EIS publication. At these meetings the public will have the opportunity to express their concerns about the analyses and conclusions presented in the draft EIS. A court reporter will be present and all comments officially recorded.

Following the 45-day public comment period, preparation of the final EIS begins. At this time, all relevant comments will be evaluated and the final EIS revised (if necessary) to address these comments. Upon publication of the final EIS, its availability will be announced in the *Federal Register* and a 30-day waiting period begins. Following this waiting period, the Record of Decision will be published. This document will present the Air Force's decision regarding the proposal to base the F-35 for Force Development Evaluation and Weapons School at Nellis AFB.

Why Scoping is Important?

Scoping is just one of the tools used by federal agencies to obtain public input during the environmental impact analysis process. The goal of this process is for federal agencies to make informed decisions about their actions that could potentially affect the environment.

The Air Force uses input received during the scoping period to help identify issues for analysis. Issues raised during the scoping period are given full consideration and substantive and applicable issues will be addressed in the draft EIS. In a sense, scoping helps guide the environmental studies conducted by the Air Force for the EIS.

Scoping is not the only time when public input is critical to environmental impact analysis process. Public comments on the draft EIS will also be solicited and public hearings held following the draft EIS publication. Comments on the draft EIS help shape the final document and play an important role in determining the most suitable proposal for Air Force operations and the environment.

The Public Scoping Period

By participating in the scoping process, you will help Air Force representatives identify public issues and concerns, assist in defining the scope of analysis, as well as develop other reasonable alternatives for the F-35 beddown. The public can provide input in two ways:

1. By attending any one of five open house scoping meetings, anytime between 6 p.m. and 8 p.m. at the locations indicated below, or

SCHEDULE OF MEETINGS		
City/Town	*Date*	*Location*
Carson City	Monday, September 13	Plaza Hotel, 801 S. Carson Street
Alamo	Tuesday, September 14	Lincoln County Annex, 100 South First West Street
Pioche	Wednesday, September 15	Pioche Town Hall, Hinman and Main Streets
Pahrump	Thursday, September 16	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Friday, September 17	Hollywood Recreation Center, 1650 S. Hollywood

2. By submitting written comments anytime during the public scoping period that began on August 23, 2004. Written comments should be sent to Mr. Mike Estrada, Air Warfare Center Public Affairs Office, Nellis AFB, at the address below. Although we will accept comments throughout the process, we recommend that your scoping comments be sent by October 1, 2004 to ensure equitable consideration in the draft EA analysis.

For more information about Nellis AFB, the proposed F-35 beddown, or to submit written comments, please contact:

Mike Estrada
Air Warfare Center/Public Affairs
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Phone (702) 652-2753
Fax (702) 652-9838

Evaluación del Desarrollo de la Fuerza F-35 y Asentamiento de la Escuela de Armas Declaración de Impacto Ambiental

HOJA DE INFORMACION

Nellis AFB, NV

Septiembre de 2004

El avión de combate y ataque conjunto (Joint Strike Fighter)—F-35

El avión de combate y ataque conjunto F-35 es un avión de combate de múltiples misiones desarrollado para satisfacer las necesidades de la Fuerza Aérea, Marina, Infantería de Marina, y fuerzas aéreas aliadas. Para la Fuerza Aérea, el avión está diseñado para complementar el F-22 y reemplazaría al antiguo F-16 y las flotas A-10. La instalación (o asentamiento) de la Base de la Fuerza Aérea (AFB) para aviones F-35 en Nellis le daría a la Fuerza Aérea la capacidad de cumplir los requisitos de la misión de la Escuela de Armas y la Evaluación de Desarrollo de la Fuerza al probar los sistemas de los aviones, desarrollar y refinar las tácticas y maniobras que el avión puede realizar, y entrenar a la tripulación para volar el F-35 en condiciones de combate.

Antecedentes

El concepto para el avión F-35 comenzó a mediados de los 90s cuando el líder del Departamento de Defensa decidió usar la última tecnología de un jet de combate en un armazón común para satisfacer las necesidades de las diversas ramas del ejército. Las características del diseño de un avión común (por ejemplo, el armazón, motor, aviónica) maximizarán los ahorros haciendo posible que la Fuerza Aérea, Marina e Infantería de Marina modernicen sus flotas de aviones antiguos. Los componentes del F-35 de la Fuerza Aérea que lo distinguen de otras variantes del F-35 son un cañón interno, sensores infrarrojos y un indicador láser de objetivos.

Cuando se combina con el dominio del aire del F-22, la aviónica y sigilo del F-35 tienen el propósito de permitir que el avión penetre defensas de misiles de tierra al aire para destruir los objetivos.

Contenido

¿Cuál es la acción propuesta?

La Fuerza Aérea propone establecer los programas de Evaluación de Desarrollo de la Fuerza F-35 y la Escuela de Armas en Nellis AFB, Nevada. La propuesta comenzaría instalando la base para aviones F-35 en el año fiscal (FY) 2009 y continuaría hasta el FY 2019, para un total de 36 F-35. El retiro de los F-16 y A-10 que están siendo reemplazados por los F-35 comenzaría en FY 2019. La propuesta también incluiría la construcción de un hangar F-35 y unidades de mantenimiento, así como una instalación de equipo aeroespacial de tierra; una rampa / estacionamiento para los aviones; depósitos de hormigón para el almacenamiento de municiones; instalaciones de apoyo operativo; renovación de las instalaciones actuales y las mejoras de infraestructura necesarias para respaldar la instalación de la base. La construcción comenzaría en FY 2007 y concluiría en FY 2013. Los cambios de personal, que resultan en una ligera reducción del personal total en la base, ocurrirían del FY 2009 al FY 2028.

Propósito y necesidad de la acción propuesta

El propósito de la acción propuesta es implementar el programa FDE F-35 y WS en Nellis AFB, en respuesta a la decisión del Congreso de los Estados Unidos de que es necesario reemplazar las flotas de F-16 y A-10 antiguos de la Fuerza Aérea. El programa de Evaluación de Desarrollo de la Fuerza tiene distintas funciones importantes:

- perfecciona la doctrina y tácticas de utilización en respuesta a amenazas variables;
- desarrolla o perfecciona procedimientos operativos y programas de entrenamiento;
- evalúa los cambios a los aviones y verifica la corrección de nuevas deficiencias encontradas después del despliegue del sistema;
- explora medios no materiales (por ejemplo, tácticas) para satisfacer requisitos operativos variables, siempre que el avión continúe en el inventario;
- evalúa los cambios de rutina del software (programas operativos de vuelo), mejoras del producto planeadas anticipadamente, modificaciones, modernizaciones, actualizaciones de los datos de la misión, y otras mejoras o cambios siempre que el avión esté en el inventario;
- investiga, demuestra, hace uso de, analiza y evalúa tácticas contra amenazas anticipadas; y
- se asegura del adecuado desempeño del avión en combate al proporcionar entrenamiento, información sobre las capacidades operativas y nuevos requisitos.

Además de la FDE, la Fuerza Aérea debe establecer y mantener una WS por cada tipo de avión en su inventario. Este programa opera durante la vida útil del avión, adaptándose a cambios en la tecnología, tácticas y amenazas. Los comentarios para y del programa FDE son esenciales para la WS debido a que aplica, evalúa y perfecciona tácticas desarrolladas bajo FDE. La WS proporciona entrenamiento actualizado a los pilotos que ya están calificados para volar el aparato. Con tácticas y entrenamiento de combate como su enfoque, la WS ofrece instrucción rigurosa, intensiva y realista que permite a los graduados de WS enseñar con eficacia técnicas de combate a los miembros de sus unidades de operación.

Un resumen de la Ley de Política Nacional de Protección Ambiental

La Ley de Política Nacional de Protección Ambiental (NEPA) es el capítulo nacional para promover la armonía productiva entre el hombre y el medio ambiente, y reducir al mínimo los impactos de las acciones federales. Esta ley exige a todas las agencias federales considerar los posibles impactos ambientales al tomar decisiones sobre esas acciones. La participación del público es una parte esencial del proceso. A través de la participación del público y completando los análisis detallados sobre el medio ambiente, el proceso de NEPA ayuda a que los encargados de tomar las decisiones tomen la mejor decisión informada posible.

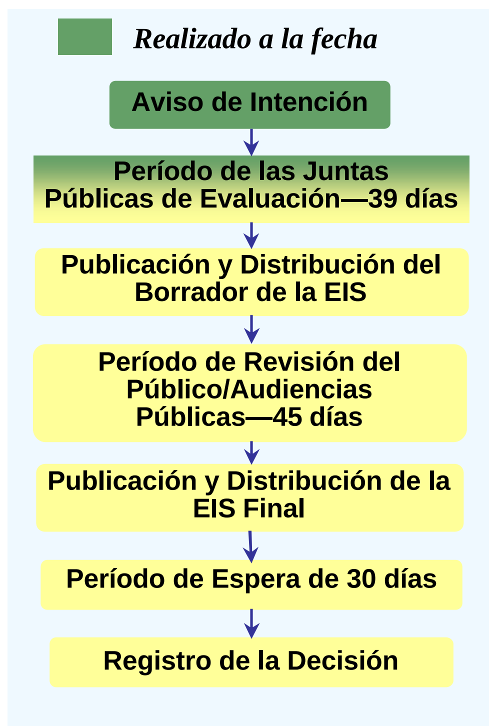
Tomar decisiones informadas es crucial

Las decisiones informadas se basan en la presentación abierta y objetiva de los impactos ambientales. La Fuerza Aérea está visitando las comunidades potencialmente afectadas por la acción propuesta. Están buscando comentarios públicos a esta acción propuesta, así como nuevas sugerencias que el público podría tener para la propuesta de instalar una base de aviones F-35. Para realizar la EIS, la Fuerza Aérea recopilará datos, conducirá una investigación y analizará los efectos potenciales de la acción propuesta sobre el medio ambiente afectado. Se estudiarán recursos como el manejo del espacio aéreo, el ruido, la calidad del aire, y los efectos potenciales sobre los recursos biológicos y culturales. Se identificarán el tipo y extensión de los impactos que resulten de la instalación de la base propuesta, y se analizará y determinará el grado en que estos impactos podrían afectar potencialmente los recursos.

El proceso de análisis del impacto ambiental

El proceso de análisis del impacto ambiental (EIAP) comenzó cuando la Fuerza Aérea publicó un Aviso de Intención en el *Registro Federal* el 23 de agosto de 2004. Este Aviso anunció que la Fuerza Aérea planea conducir un análisis ambiental para la instalación de la base F-35. El período de las juntas públicas de evaluación también comenzó en ese momento. Aunque se aceptan comentarios a lo largo de todo el proceso de análisis del impacto ambiental, la Fuerza Aérea alienta a que estos comentarios se envíen a más tardar el 1 de octubre de 2004 para garantizar que se les dé una total consideración en las primeras etapas del proceso de análisis del impacto ambiental. Durante el período de las juntas públicas de evaluación comenzará la preparación del borrador de la Declaración de Impacto Ambiental (EIS). Los comentarios de las juntas públicas de evaluación, la investigación, las consultas de la agencia y tribales, así como diversos estudios contribuyen a la terminación del borrador EIS.

El borrador EIS se publicará una vez que esté terminado, y su disponibilidad se anunciará en el *Registro Federal* y los periódicos locales. Esto inicia el período oficial de comentarios de 45 días. En este momento se enviarán copias del borrador EIS a las agencias federales, estatales y locales, a las tribus de indios americanos y a los ciudadanos que expresen su interés en recibir una copia. Se cederán audiencias públicas aproximadamente tres semanas después de la publicación del borrador EIS. En estas reuniones el público tendrá la oportunidad de expresar sus inquietudes acerca del análisis y conclusiones presentadas en el borrador EIS. Estará presente un escribiente judicial y se grabarán oficialmente todos los comentarios.



Después del período de comentarios públicos de 45 días, comenzará la preparación de la EIS final. En este momento se evaluarán todos los comentarios relevantes y se revisará el EIS final (si es necesario) para tratar estos comentarios. Al publicarse el EIS final, se anunciará su disponibilidad en el *Registro Federal* y comenzará un período de espera de 30 días. Después de este período de espera, se publicará el Registro de la Decisión. Este documento presentará la decisión de la Fuerza Aérea con respecto a la propuesta de instalar una base para la Evaluación del Desarrollo de la Fuerza F-35 y una Escuela de Armas en Nellis AFB.

¿Por qué son importantes las juntas públicas de evaluación?

Las juntas públicas de evaluación son sólo una de las herramientas utilizadas por las agencias federales para obtener comentarios del público durante el proceso de análisis del impacto ambiental. El objetivo de este proceso es que las agencias federales tomen decisiones informadas acerca de sus acciones que podrían afectar potencialmente el medio ambiente.

La Fuerza Aérea utiliza los comentarios recibidos durante el período de las juntas públicas de evaluación para ayudar a identificar temas para su análisis. Los temas surgidos durante las juntas públicas reciben una total consideración, y aquellos temas fundamentales y aplicables se tratarán en el borrador EIS. En un sentido, las juntas públicas de evaluación ayudan a guiar los estudios ambientales conducidos por la Fuerza Aérea para la EIS.

Las juntas públicas no es el único momento en el que los comentarios públicos son críticos para el proceso de análisis del impacto ambiental. También se solicitarán los comentarios públicos del borrador EIS, y se cederán audiencias públicas después de la publicación del borrador EIS. Los comentarios en el borrador EIS ayudan a desarrollar el documento final y juegan un papel importante para determinar la propuesta más idónea para las operaciones de la Fuerza Aérea y el medio ambiente.

El período de las juntas públicas de evaluación

1. Asistiendo a una de las cinco juntas públicas de evaluación, entre las 6:00 p.m. y 8:00 p.m., en los sitios indicados a continuación, o

CALENDARIO DE LAS REUNIONES		
Ciudad / Poblacion	***Fecha***	***Ubicación***
Carson City	Lunes 13 de septiembre	Plaza Hotel, 801 S. Carson Street
Alamo	Martes 14 de septiembre	Lincoln County Annex, 100 South First West Street
Pioche	Miércoles 15 de septiembre	Pioche Town Hall, Hinman y Main Streets
Pahrump	Jueves 16 de septiembre	Bob Rudd Community Center, 150 N. Highway 160
Las Vegas	Viernes 17 de septiembre	Hollywood Recreation Center, 1650 S. Hollywood

2. Enviando los comentarios por escrito durante el período de las juntas públicas de evaluación, el cual comienza el 23 de agosto de 2004. Los comentarios por escrito deberán enviarse a Mr. Mike Estrada, Air Warfare Center Public Affairs Office, Nellis AFB, a la dirección de abajo. Aunque aceptaremos comentarios a lo largo de todo el proceso, recomendamos que sus comentarios sean enviados antes del 1 de octubre de 2004 para garantizar su consideración equitativa en el análisis del borrador EA.

Para mayor información sobre Nellis AFB, propuesta para la instalación de la base F-35, ó para enviar comentarios por escrito, sírvase contactar a:

Mike Estrada
Air Warfare Center/Public Affairs
4370 N. Washington Blvd., Suite 223
Nellis AFB, NV 89191-7078
Phone (702) 652-2753
Fax (702) 652-9838

F-35 Beddown at Nellis AFB

FACT SHEET

September 2004 Nellis AFB, NV

F-35 Joint Strike Fighter

Mission

The F-35 is designed to complement the F-22 and replace the aging F-16 and A-10 fleets. It is primarily a *stealth* air-to-ground fighter, with air-to-air combat capability. During initial phases of an air campaign it performs stealthy strikes using an internal weapons load system that suppresses air defenses, hits heavily defended targets, and protects U.S. aircraft and ground forces from enemy ground attack. In later phases of a conflict, when stealth is not required, the F-35 can carry heavier external weapon loads.

Features

The multi-role F-35 (or Joint Strike Fighter [JSF]) builds on all current-generation fighter aircraft to offer superior capabilities. It was designed to replace a wide range of aging fighter and strike aircraft from the U.S. Air Force, Marine Corps, and Navy.

AFFORDABILITY: The F-35 evolved with focus on reducing the cost of development, procurement, and ownership. Joint development of the three F-35 variants takes advantage of economies of scale and allows an estimated 80 percent commonality in parts. Data show that the F-35 should cost 40 to 50 percent less to operate and support than comparable prior aircraft.

STEALTH: A combination of countermeasures, advanced avionics to enhance the pilot's situational awareness, low radar profile which allows weapons and fuel to be carried internally for maintaining low observability, and aircraft and weapons characteristics allow the F-35 to avoid, withstand, and counter enemy threats.

SUPPORTABILITY: The F-35 has a reduced logistics footprint making it significantly easier to deploy than the F-16 and an increased sortie generation rate to provide more combat power earlier in theater. An Autonomic Logistics Information System allows for integrated support and training for high reliability and maintainability.

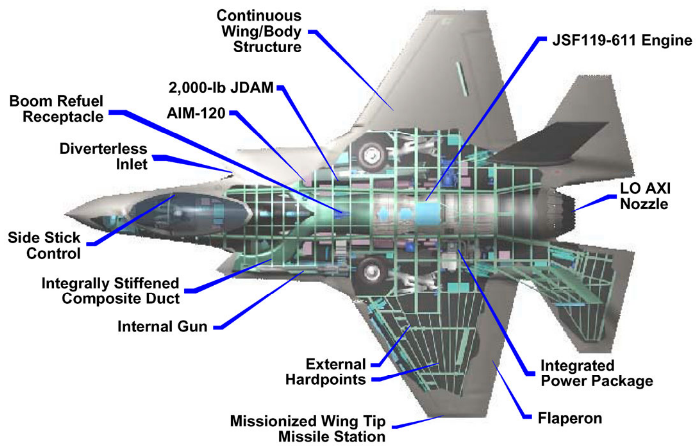
WEAPONS: The F-35 payload is markedly greater than those of current fighter aircraft. It is designed to carry the newest air-to-ground munitions, such as Joint Direct Attack Munition (JDAM) and other ground attack weapons. In addition, it will carry air-to-air weapons such as an internal gun and missile. Integrated sensors will enhance delivery of current and future precision weapons to provide greater electronic domination of the battle space.

F-35 Beddown at Nellis AFB (continued)

F-35 Development

The F-35 Joint Strike Fighter Program emerged from the Pentagon's Joint Advanced Strike Technology Program created in 1993 to define and develop technology that would support the future development of tactical aircraft. This program merged several independent government projects working on next-generation strike aircraft, including the Navy Attack/Fighter-Experimental, Air Force Multi-Role Fighter, and Marine Corps Common Affordable Lightweight Fighter projects. The goal was to build an affordable universal fighter that would meet the needs of all participants.

A 1994 Concept Exploration study found that a "tri-service family" of aircraft was the most affordable solution to the collective needs. This family entailed a single basic airframe design with three distinct variants: Conventional Take-Off and Landing (CTOL) for the U.S. Air Force; Short Take-Off/Vertical Landing (STOVL) for the U.S. Marine Corps; and a Carrier Variant (CV) for the U.S. Navy. Next, major aircraft manufacturers participated in a concept definition and design competition from which two concepts were selected as finalists in 1996 and development and testing of three different configurations of demonstrator aircraft began. From this concept demonstration phase, a construction contract was awarded to Lockheed Martin in October 2001. A Pratt & Whitney engine is integrated into this aircraft design.



Current plans call for 22 aircraft to be built in the initial System Development Demonstration Phase. The first prototypes are being assembled in Lockheed Martin's Fort Worth, Texas, facility and flight testing is proposed to be carried out at Edwards Air Force Base, California, and Patuxent River Naval Air Warfare Center, Maryland. Successful Preliminary Design Review was completed in April 2003 and critical Design Review is scheduled for April 2005. The first F-35 production airframe is expected to enter service in 2008.

F-35 Air Force Facts

Crew:	F-35, one pilot
Engine:	Pratt & Whitney F135 or General Electric F119 turbofan with 35,000 pounds of thrust (engines interchangeable across multi-service JSF aircraft)
Speed:	Maximum Mach 1 at altitude
Combat Radius:	Approximately 500 miles
Armament:	Primarily air-to-ground with air-to-air capability
Wing Span:	35 feet
Fuselage and tail:	Approximately 51 feet long and 17 feet high
Weight:	Maximum take-off, 50,000 pounds; empty, approximately 27,000 pounds
Contractor:	Lockheed Martin Corporation with partners Northrop Grumman and BAE Systems

ATTACHMENT D

IICEP Letters

F-35 IICEP Letters Sent Out		
Name	***Title***	***Group***
Native American Tribes		
Mr. Everet Pikayvitt	Tribal Representative	Moapa Band of Paiutes
Mr. Joe Kennedy	Tribal Representative	Timbisha Shoshone Tribe
Mr. Maurice Frank-Churchill	Tribal Representative	Duckwater Shoshone Tribe
Mr. Marian Zucco	Tribal Representative	Big Pine Paiute Tribe of the Owens Valley
Mr. Jason Warren	Tribal Representative	Big Pine Paiute Tribe of the Owens Valley
Ms. Gevene Savala	Tribal Representative	Kaibab Band of Southern Paiutes
Ms. Linda Otero	Tribal Representative	Fort Mojave Tribe
Mr. Richard Arnold	Tribal Chairman	Pahrump Paiute Tribe
Ms. Jessica Bacoch	Tribal Chairwoman	Big Pine Paiute Tribe of the Owens Valley
Mr. James Birchim	Tribal Chairman	Yomba Shoshone Tribe
Ms. Carmen Bradley	Tribal Chairwoman	Kaibab Band of Southern Paiutes
Mr. Daniel Eddy, Jr.	Tribal Chairman	Colorado River Indian Tribes
Ms. Nora Helton	Tribal Chairwoman	Fort Mojave Tribe
Ms. Gloria Hernandez	Tribal Chairwoman	Las Vegas Paiute Tribe
Ms. Rachel Joseph	Tribal Chairwoman	Lone Pine Paiute-Shoshone Tribe
Ms. Georgia Kennedy	Tribal Chairwoman	Timbisha Shoshone Tribe
Mr. Victor McQueen, Sr.	Tribal Chairman	Ely Shoshone Tribe
Ms. Rose Marie Saulque	Tribal Chairwoman	Benton Paiute Indian Tribe
Mr. Edward Smith	Tribal Chairman	Chemehuevi Indian Tribe
Mr. Philbert Swain	Tribal Chairman	Moapa Band of Paiutes
Ms. Lora Tom	Tribal Chairwoman	Paiute Indian Tribes of Utah
Mr. Doug Vega	Tribal Chairman	Bishop Paiute Indian Tribe
Mr. Richard Wilder	Tribal Chairman	For Independence Indian Tribe
Ms. Alfreida Walker	Tribal Chairwoman	Duckwater Shoshone Tribe
Mr. Kenny Andersen	Tribal Representative	Las Vegas Paiute Tribe
Mr. Felton Bricker	Tribal Representative	Fort Mojave Tribe
Ms. Lisa Cagle	Tribal Representative	Yomba Shoshone Tribe
Mr. Jerry Charles	Tribal Representative	Ely Shoshone Tribe
Mr. Lee Chavez	Tribal Representative	Bishop Paiute Indian Tribe
Ms. Betty L. Cornelius	Tribal Representative	Colorado River Indian Tribes
Ms. Darlene Dewey	Tribal Representative	Yomba Shoshone Tribe
Mr. Brenda Drye	Tribal Representative	Kaibab Band of Southern Paiutes
Unknown	Tribal Representative	Las Vegas Paiute Tribe
Ms. Pauline Esteves	Tribal Representative	Timbisha Shoshone Tribe
Mr. Maurice Frank-Churchill	Tribal Representative	Yomba Shoshone Tribe
Ms. Grace Goad	Tribal Representative	Timbisha Shoshone Tribe
Mr. Bill Helmer	Tribal Historic Preservation Officer	Timbisha Shoshone Tribe
Ms. Eleanor Hemphill	Tribal Representative	Fort Independence Indian Tribe
Ms. Clara Belle Jim	Tribal Representative	Pahrump Paiute Tribe
Mr. Gerald Kane	Tribal Representative	Bishop Paiute Indian Tribe
Mr. Darryl King	Tribal Representative	Chemehuevi Indian Tribe

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Ms. Lawanda Lafoon	Tribal Representative	Unknown
Ms. Cynthia V. Lynch	Tribal Representative	Pahrump Paiute Tribe
Ms. Tara Marlowe	Tribal Representative	Paiute Indian Tribes of Utah
Ms. Dorena Marineau	Tribal Representative	Paiute Indian Tribes of Utah
Mr. Calvin Meyers	Tribal Representative	Moapa Band of Paiutes
Ms. Lalovi Miller	Tribal Representative	Moapa Band of Paiutes
Ms. Gaylene Moose	Tribal Representative	Bishop Paiute Tribe
Ms. Lori Harrison	Chairwoman of the Board of Directors	Las Vegas Indian Center
Wildlife & BLM Offices		
Mr. Bill Fisher		BLM- Tonopah Field Office
Mr. Gene Kolkman		BLM- Ely Field Office
Mr. R. Michael Turnipseed	Director	Dept. of Conservation and Natural Resources, Nevada
Mr. Mark Morse	Office Manager	BLM- Las Vegas Field Office
Unknown	Unknown	Nevada Department of Wildlife
Mr. Robert Abbey	State Director	BLM
Mr. Dick Birger	Project Leader	Desert National Wildlife Refuge Complex Office
Ms. Amy Sprunger-Allworth		Desert National Wildlife Refuge Complex Office
Mr. Terry Crawfoth	Administrator	NV Department of Wildlife Reno Headquarters
Mr. Robert Williams	State Supervisor	U.S. Fish and Wildlife NV Ecological Field Office
State Historic Preservation Office		
Mr. Ronald James	SHPO	Historic Preservation Office
Environmental Offices		
Mr. Allen Biaggi	Administrator	NV Division of Environmental Protection, Capital Complex
Mr. Michael Stafford		NV State Clearinghouse Department of Administration
Mr. Wayne Nastri	Regional Administrator	U.S. EPA, Region IX Office of the Regional Administrator
Mr. Willie R. Taylor	Director	Office of Environmental Policy and Compliance
Unknown	Unknown	Nevada Division of Emergency Management
Honorable Raymond C. Shaffer		State Senate
Honorable Kenny Guinn	Governor of Nevada	
Honorable John Ensign	United States Senator	
Honorable Jon C. Porter		
Honorable Jim Gibbons		
Honorable Shelley Berkley		
Honorable Harry Reid	United States Senator	

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Office Holders		
Mr. Mike McGinness	Senate Member	Central Nevada Senatorial District
Mr. Mark E. Amodei		Capital Senatorial District- Republican
Terry Cage		Clark- 7th, Democrat
Ms. Maggie A. Carlton		Clark- 2nd, Democrat
Ms. Barbara Cegavske		Clark- 8th, Republican
Mr. Bob Coffin		Clark- 10th, Democrat
Mr. Warren B. Hardy		Clark- 12th, Republican
Mr. Joseph Neal		Clark- 4th, Democrat
Mr. Dennis Nolan		Clark- 9th, Republican
Ms. Ann O'Connell		Clark- 5th, Republican
Mr. Raymond D. Rawson		Clark- 6th, Republican
Mr. Michael Schneider		Clark- 11th, Democrat
Mr. Raymond C. Shaffer		Clark- 1st, Republican
Ms. Sandra Tiffany		Clark- 5th, Republican
Ms. Dina Titus		Clark- 7th, Republican
Ms. Valerie Wiener		Clark- 3rd, Democrat
Mr. Bob McCleary	Assembly Member	Clark County, District 11
Mr. David Goldwater	Assembly Member	Clark County, District 10
Mr. Tom Collins	Assembly Member	Clark County, District 1
Mr. Chris Munhall		Unknown
Mr. Bruce Woodbury	Commissioner	Clark County Board of Commissioners
Mr. Chis Giunchigliana	Assembly Member	Clark County, District 9
Mr. Barbara Buckley	Assembly Member	Clark County, District 8
Mr. Morse Arberry, Jr.	Assembly Member	Clark County, District 7
Mr. Wendell P. Williams	Assembly Member	Clark County, District 6
Ms. Valerie Weber	Assembly Member	Clark County, District 5
Mr. Harry Mortenson	Assembly Member	Clark County, District 42
Mr. David Parks	Assembly Member	Clark County, District 41
Mr. Ron Knecht	Assembly Member	Carson City (part), District 40
Ms. Lynn Hettrick	Assembly Member	Carson City (part), District 39
Mr. Bob Beers	Assembly Member	Clark County, District 4
Mr. Tom Grady	Assembly Member	Carson City (part), District 38
Mr. Marcus Conklin	Assembly Member	Clark County, District 37
Mr. Rod Sherer	Assembly Member	Clark County, District 36
Mr. William Horne	Assembly Member	Clark County, District 34
Ms. Peggy Pierce	Assembly Member	Clark County, District 3
Mr. Josh Griffin	Assembly Member	Clark County, District 29
Ms. Vonne Chowning	Assembly Member	Clark County, District 28
Mr. Richard Perkins	Assembly Member	Clark County, District 23
Mr. David Brown	Assembly Member	Clark County, District 22
Mr. Walter Andonov	Assembly Member	Clark County, District 21
Mr. Joe Hardy	Assembly Member	Clark County, District 20
Mr. Garn Mabey	Assembly Member	Clark County, District 2
Mr. Jerry D. Claborn	Assembly Member	Clark County, District 19
Mr. Mark Manendo	Assembly Member	Clark County, District 18

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Mr. Kelvin Atkinson	Assembly Member	Clark County, District 17
Mr. John Oceguera	Assembly Member	Clark County, District 16
Ms. Kathy McClain	Assembly Member	Clark County, District 15
Ms. Ellen Koivisto	Assembly Member	Clark County, District 14
Mr. Chad Christensen	Assembly Member	Clark County, District 13
Ms. Genie Ohrenschall	Assembly Member	Clark County, District 12
Mr. Rory Reed	Commissioner	Clark County Board of Commissioners
Ms. Yvonne Atkinson Gates	Commissioner	Clark County Board of Commissioners
Ms. Candice Trummell	Commissioner	Nye County Board of Commissioners
Mr. Henry Neth	Commissioner	Nye County Board of Commissioners
Ms. Joni Eastley	Commissioner	Nye County Board of Commissioners
Ms. Patricia Cox	Commissioner	Nye County Board of Commissioners
Ms. Roberta Carver	Commissioner	Nye County Board of Commissioners
Mr. Jim Manner	Commissioner	Lincoln County Board of Commissioners
Mr. Dan Frehner	Commissioner	Lincoln County Board of Commissioners
Mr. Paul Christensen	Commissioner	Lincoln County Board of Commissioners
Mr. Edward Wright	Commissioner	Lincoln County Board of Commissioners
Mr. Ray Flake	Commission Vice Chairman	Lincoln County Board of Commissioners
Mr. Chip Maxfield	Commissioner	Clark County Board of Commissioners
Ms. Mary Kincaid-Chauncey	Commissioner	Clark County Board of Commissioners
Mr. Mark James	Commissioner	Clark County Board of Commissioners
Ms. Myrna Williams	Commissioner	Clark County Board of Commissioners
Mr. Michael Bingham	Chairman	Indian Springs Town Board
City Mangers, Mayors, Chamber of Commerce		
		Pahrump Valley Chamber of Commerce
		North Las Vegas Chamber of Commerce
		Tonopah Nevada Chamber of Commerce
		Goldfield Chamber of Commerce
		Latin Chamber of Commerce
		Women's Chamber of Commerce of Nevada
		Armagosa Chamber of Commerce
		Las Vegas Chamber of Commerce
		Henderson Chamber of Commerce
		Asian Chamber of Commerce
		Beatty Chamber of Commerce
		Boulder City Chamber of Commerce
		Pioche Chamber of Commerce

F-35 IICEP Letters Sent Out (con't)		
Name	***Title***	***Group***
Mr. Glenn Van Roekel	City Manager	City of Caliente
Mr. Phil Speight	City Manager	City of Henderson
Mr. Gregory E. Rose	City Manager	City of North Las Vegas
Mr. Douglas Selby	City Manager	City of Las Vegas
Honorable Jim Gibson	Mayor of Henderson	
Honorable Robert Ferraro	Mayor of Boulder City	
Honorable Oscar B. Goodman	Mayor of Las Vegas	
Honorable Michael Montandon	Mayor of North Las Vegas	

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

12 AUG 2004

MEMORANDUM FOR: Mr. Everet Pikayvitt, Tribal Representative
Moapa Band of Paiutes
P.O. Box
Moapa NV 89025

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Environmental Impact Statement for the F-35 Force Development Evaluation and Weapons School Permanent Beddown, Nellis Air Force Base Nevada

The United States Air Force (Air Force) is in the initial stages of preparing an Environmental Impact Statement (EIS) to analyze environmental impacts from permanently bedding down F-35 aircraft at Nellis Air Force Base (AFB) Nevada. The F-35 is the next generation, stealth air-to-ground fighter designed to complement the F/A-22 and replace the aging F-16 and A-10 aircraft fleets. The Air Force proposes to base, in phases, 36 F-35 aircraft at Nellis AFB between 2009 and 2028. Flight activities would occur in Nellis AFB and Nevada Test and Training Range (NTTR) airspace (see attached map). New construction required to support the beddown would occur on Nellis AFB over a three-year time period beginning in 2007. No new construction would occur on the NTTR.

In support of this process we request your input in identifying general or specific issues or areas of concern you feel should be addressed in the EIS. In addition, if your tribe recently completed, is currently implementing, or is planning to undertake any new activities which you believe should be included as part of our cumulative impact analysis, we ask you to identify the activity and provide a point of contact.

The Air Force plans to hold a series of scoping meetings to receive public input on alternatives, concerns, and issues to be addressed in the EIS. Meetings would be held at the following locations:

Sept 13, 6 p.m. – 8 p.m. Plaza Hotel, 801 S. Carson Street, Carson City
Sept 14, 6 p.m. – 8 p.m. Lincoln County Annex, 100 South First West Street, Alamo
Sept 15, 6 p.m. – 8 p.m. Pioche Town Hall, Hinman and Main Streets, Pioche
Sept 16, 6 p.m. – 8 p.m. Bob Ruud Community Center, 150 N. Highway 160, Pahrump
Sept 17, 6 p.m. – 8 p.m. Hollywood Recreation Center, 1650 S. Hollywood, Las Vegas

Please forward any identified issues or concerns to Sheryl Parker, F-35 EIS Project Manager at the above address. If you have any questions about the proposal, you may contact her at (757) 764-9334, or the Nellis AFB point of contact, Mr. Jim Campe. Mr. Campe may be reached at 99 CES/CEV, 4349 Duffer Drive, Ste 1601, Nellis AFB NV 89191 or at (702) 652-5813. We cordially request comments or concerns be sent by October 1, 2004; however, we will consider comments received at any time during the environmental process to the extent possible.

Jo Ann Whitson

JO ANN M. WHITSON
Chief, Environmental Analysis Branch

Atch
Map of Affected Area

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

16 AUG 2004

Brigadier General Patrick A. Burns
HQ ACC/CE
129 Andrews St., Suite 102
Langley AFB VA 23665-2769

The Honorable Harry Reid
United States Senator
Lloyd D. George Building
333 Las Vegas Boulevard South, Suite 8016
Las Vegas NV 89101

Dear Senator Reid

The United States Air Force (Air Force) is preparing an Environmental Impact Statement (EIS) to assess the potential environmental impacts associated with permanently bedding down F-35 aircraft at Nellis AFB Nevada. We plan to hold several public scoping meetings to solicit public and government agency comments on the proposal to assist us in shaping the analysis. We look forward to receiving your comments as part of this process.

The F-35 is the next generation stealth air-to-ground fighter, designed to complement the F/A-22 and replace the aging F-16 and A-10. The beddown at Nellis would support the Force Development Evaluation mission and the United States Air Force Weapons School and would occur in phases between the years 2009 and 2028. The proposed action would also include facility construction activities on Nellis AFB which would be phased over a three-year period.

Meetings will be held at the locations shown below. During the meetings, the Air Force will describe the proposed action and alternatives, the National Environmental Policy Act process and outline the opportunities for public involvement.

September 13, 6 p.m. - 8 p.m. Plaza Hotel, 801 S. Carson Street, Carson City
September 14, 6 p.m. - 8 p.m. Lincoln County Annex, 100 South First West Street, Alamo
September 15, 6 p.m. - 8 p.m. Pioche Town Hall, Hinman and Main Streets, Pioche
September 16, 6 p.m. - 8 p.m. Bob Rudd Community Center, 150 N. Highway 160, Pahrump
September 17, 6 p.m. - 8 p.m. Hollywood Recreation Center, 650 S. Hollywood, Las Vegas

If you or your staff has any questions or concerns about the proposal or process we would like to hear from you. Our EIS Project Manager is Ms. Sheryl Parker, HQ ACC/CEVP and can be reached at the above address or at (757) 764-9334.

Sincerely

V/R Patrick A. Burns

PATRICK A. BURNS
Brigadier General, USAF
The Civil Engineer

cc:
SAF/LL
HQ AF/ILEV

Global Power For America

ATTACHMENT E

Draft Distribution List

Scoping Meeting Attendees

Meeting City	*Prefix*	*First*	*Last*	*Organization Name*	*City*	*State*
Carson City	Mr.	Mark	Harris	PUCN	Carson City	NV
	Mr.	Adam	Titus	Industrial Properties Development, Inc.	Las Vegas	NV
	Mr.	Alan	Caldwell	Sierra Concepts	Minden	NV
	Mr.	Tim	Anderson	Reno Gazette Journal	Carson City	NV
Alamo	Ms.	Marian	Fodge		Alamo	NV
	Mr.	Allan	Pritcher		Alamo	NV
	Mr.	Darrel	Jones		Alamo	NV
	Mr.	Lawrence	Woolever		Alamo	NV
	Mrs.	Paula	Woolever		Alamo	NV
	Mr.	David	Maxwell		Alamo	NV
	Ms.	Betty Jo	Jarvis		Hiko	NV
	Mr.	David	Hansen		Alamo	NV
	Ms.	Dominique	Slone		Hiko	NV
	Ms.	Debi	DeSchryver		Alamo	NV
	Mr.	Keith	Simmons		Alamo	NV
	Mr.	Adam	Titus	Industrial Properties Development, Inc.	Las Vegas	NV
	Ms.	Debbie	Meldrum		Alamo	NV
	Mr.	A.C.	Frehner		Alamo	NV
		C.	Balew		Alamo	NV
Pioche	Mr.	Joseph	Moffo		Pioche	NV
	Mr.	Randy	Johnson		Caliente	NV
	Mr.	Patrick	Gloeckner		Pioche	NV
	Mr.	Richard	Orr	BLM	Caliente	NV
Pahrump	Mr.	Gary	Hollis		Pahrump	NV
	Ms.	Geneva	Hollis		Pahrump	NV
	Mr.	Sheldon	Bass		Pahrump	NV
	Mr.	Arnold	Owen		Pahrump	NV
Las Vegas	Ms.	Elsie	Kelly		Las Vegas	NV
	Mr.	Jim	Aaron		Las Vegas	NV
	Mrs.	Patti	Aaron		Las Vegas	NV
	Mr.	David	Hermann		Las Vegas	NV
	Mr.	Dave	Trombley		Las Vegas	NV
	Mrs.	Sue	Trombley		Las Vegas	NV
	Mr.	Douglas	Crowe		Las Vegas	NV
	Mr.	David	Rosales		Las Vegas	NV
	Ms.	Linda	DeVine		Gloucester Pt.	VA
		Eric & Jacob	Marion		Las Vegas	NV
	Mr.	Michael	McEleney		Henderson	NV
	Ms.	Joann	Schoch		Henderson	NV

Additions to List

First	*MI*	*Last*	*Organization Name*	*City*	*State*
Robert		Hall	President, Nevada Environmental Coalition Inc.	Las Vegas	NV
			Rural Alliance for Military Accountability	Reno	NV

Congress-State
Elected Officials

Prefix	First	MI	Last	Title	Organization Name	City	State
Honorable	John		Ensign	U.S. Senator	Lloyd George Federal Bldg	Las Vegas	NV
Honorable	Harry		Reid	U.S. Senator	Lloyd George Federal Bldg	Las Vegas	NV
Honorable	Jim		Gibbons	Governor		Las Vegas	NV
Mr.	Mark	E.	Amodei	Senate Member	Capital Senatorial District	Carson City	NV
Honorable	Robert		Ferraro	Mayor of Boulder City	City Hall	Boulder City	NV
Honorable	James	B.	Gibson	Mayor of Henderson	City Hall	Henderson	NV
Honorable	Oscar	B.	Goodman	Mayor of Las Vegas	City Hall	Las Vegas	NV
Honorable	Michael		Montandon	Mayor of North Las Vegas	City Hall	North Las Vegas	NV
Honorable	Shelley		Berkley	U.S. Congresswoman	District 1	Las Vegas	NV
Honorable	Dean		Heller	U.S. Congressman	District 2	Las Vegas	NV
Honorable	Jon	C.	Porter	U.S. Congressman	District 3	Henderson	NV
Mr.	Phil		Speight	City Manager	City of Henderson	Henderson	NV
Mr.	Douglas		Selby	City Manager	City of Las Vegas	Las Vegas	NV
Mr.	Gregory	E.	Rose	City Manager	City of North Las Vegas	North Las Vegas	NV
Ms.	Marilyn		Kirkpatrick	Assembly Member, Clark County	District 1	North Las Vegas	NV
Mr.	John		Lee	Senate Member, Clark County	District 1	North Las Vegas	NV
Mr.	Garn		Mabey	Assembly Member, Clark County	District 2	Las Vegas	NV
Ms.	Maggie		Carlton	Senate Member, Clark County	District 2	Las Vegas	NV
Ms.	Peggy		Pierce	Assembly Member, Clark County	District 3	Las Vegas	NV
Ms.	Valerie		Wiener	Senate Member, Clark County	District 3	Las Vegas	NV
Ms.	Francis		Allen	Assembly Member, Clark County	District 4	Las Vegas	NV
Mr.	Steven		Horsford	Senate Member, Clark County	District 4	North Las Vegas	NV
Ms.	Valerie		Weber	Assembly Member, Clark County	District 5	Las Vegas	NV
Mr.	Joe		Heck	Senate Member, Clark County	District 5	Henderson	NV
Ms.	Joyce		Woodhouse	Senate Member, Clark County	District 5	Henderson	NV
Mr.	Harvey	J.	Munford	Assembly Member, Clark County	District 6	Las Vegas	NV
Mr.	Bob		Beers	Senate Member, Clark County	District 6	Las Vegas	NV
Mr.	Morse		Arberry Jr.	Assembly Member, Clark County	District 7	Las Vegas	NV
Mr.	Terry		Care	Senate Member, Clark County	District 7	Las Vegas	NV
Ms.	Dina		Titus	Senate Member, Clark County	District 7	Las Vegas	NV
Ms.	Barbara		Buckley	Assembly Member, Clark County	District 8	Las Vegas	NV
Ms.	Barbara		Cegavske	Senate Member, Clark County	District 8	Las Vegas	NV
Mr.	Tick		Segerblom	Assembly Member, Clark County	District 9	Las Vegas	NV
Mr.	Dennis		Nolan	Senate Member, Clark County	District 9	Las Vegas	NV
Mr.	Joseph	M	Hogan	Assembly Member, Clark County	District 10	Las Vegas	NV
Mr.	Bob		Coffin	Senate Member, Clark County	District 10	Las Vegas	NV
Mr.	Ruben		Kihuen	Assembly Member, Clark County	District 11	Las Vegas	NV
Mr.	Michael		Schneider	Senate Member, Clark County	District 11	Las Vegas	NV
Mr.	James		Ohrenschall	Assembly Member, Clark County	District 12	Las Vegas	NV
Mr.	Warren	B.	Hardy	Senate Member, Clark County	District 12	Las Vegas	NV
Mr.	Chad		Christensen	Assembly Member, Clark County	District 13	Las Vegas	NV
Ms.	Ellen		Koivisto	Assembly Member, Clark County	District 14	Las Vegas	NV
Ms.	Kathy		McClain	Assembly Member, Clark County	District 15	Las Vegas	NV
Mr.	John		Oceguera	Assembly Member, Clark County	District 16	Las Vegas	NV

Congress-State
Elected Officials

Prefix	First	MI	Last	Title	Organization Name	City	State
Mr.	Kelvin		Atkinson	Assembly Member, Clark County	District 17	North Las Vegas	NV
Mr.	Mark		Manendo	Assembly Member, Clark County	District 18	Las Vegas	NV
Mr.	Jerry	D.	Claborn	Assembly Member, Clark County	District 19	Las Vegas	NV
Mr.	Joe		Hardy	Assembly Member, Clark County	District 20	Boulder City	NV
Mr.	Bob		Beers	Assembly Member, Clark County	District 21	Henderson	NV
Mr.	Lynn		Stewart	Assembly Member, Clark County	District 22	Henderson	NV
Ms.	Rosemary		Womack	Assembly Member, Clark County	District 23	Henderson	NV
Mr.	Mo		Denis	Assembly Member, Clark County	District 28	Las Vegas	NV
Ms.	Susan		Gerhardt	Assembly Member, Clark County	District 29	Henderson	NV
Mr.	William		Horne	Assembly Member, Clark County	District 34	Las Vegas	NV
Mr.	Marcus		Conklin	Assembly Member, Clark County	District 37	Las Vegas	NV
Mr.	David		Parks	Assembly Member, Clark County	District 41	Las Vegas	NV
Mr.	Harry		Mortenson	Assembly Member, Clark County	District 42	Las Vegas	NV
Mr.	Mike		McGinness	Senate Member	Central Nevada Senatorial District	Fallon	NV
			Members		Indian Springs Town Advisory Board	Indian Springs	NV
Mr.	Bruce		Woodbury	Commissioner, District A	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Tom		Collins	Commissioner, District B	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Chip		Maxfield	Commissioner, District C	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Lawrence		Weekly	Commissioner, District D	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Chris		Giunchigliani	Commissioner, District E	Clark County Board of Commissioners	Las Vegas	NV
Ms.	Susan		Brager	Commissioner, District F	Clark County Board of Commissioners	Las Vegas	NV
Mr.	Rory		Reid	Commission Chairman	Clark County Board of Commissioners	Las Vegas	NV
Mr.	George	T.	Rowe	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Ms.	Rhonda		Hornbeck	Commission Chairman	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Wade		Poulser	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Bill		Loyd	Commissioner	Lincoln County Board of Commissioners	Pioche	NV
Mr.	Gary		Hollis	Commissioner, Chairperson	Nye County Board of Commissioners	Pahrump	NV
Ms.	Joni		Eastley	Commissioner Vice-Chair	Nye County Board of Commissioners	Tonopah	NV
Mr.	Peter		Liakopoulos	Commissioner	Nye County Board of Commissioners	Pahrump	NV
Ms.	Roberta		Carver	Commissioner	Nye County Board of Commissioners	Round Mountain	NV
Mr.	Andrew		Borasky	Commissioner	Nye County Board of Commissioners	Pahrump	NV
Ms.	Patrice		Lytle	City Clerk	City of Caliente	Caliente	NV

Federal-State Agencies

Prefix	***First***	***MI***	***Last***	***Title***	***Organization Name***	***City***	***State***
Mr.	Bill		Fisher		Bureau of Land Management Tonopah Field Station	Tonopah	NV
Ms.	Gosia		Targosz	Clearinghouse Coordinator	Nevada State Clearinghouse Department of Administration	Carson City	NV
Mr.	Ronald		James	SHPO	Historic Preservation Office	Carson City	NV
Mr.	Leo		Drozdoff	Administrator	Nevada Division of Env Protection State of Nevada, Capitol Complex	Carson City	NV
					Nevada Division of Emergency Management	Carson City	NV
					Nevada Department of Wildlife	Las Vegas	NV
Mr.	Juan		Palma	Office Manager	Bureau of Land Management Las Vegas Field Office	Las Vegas	NV
Mr.	Kenneth		Mayer	Director	Nevada Department of Wildlife Reno Headquarters	Reno	NV
Mr.	Robert		Williams	State Supervisor	U.S. Fish and Wildlife Service Nevada Ecological Field Office	Reno	NV
Mr.	Ron		Wenker	State Director	Bureau of Land Management State Office	Reno	NV
Mr.	Wayne		Nastri	Regional Administrator	U.S. EPA, Region IX Office of the Regional Administrator	San Francisco	CA
Mr.	Willie	R.	Taylor	Director	Office of Environmental Policy and Compliance U.S. Department of the Interior	Washington	DC
Mr.	John	A.	Ruhs		Bureau of Land Management-Ely Field Office	Ely	NV
Ms.	Cynthia		Martinez	Project Leader	Desert National Wildlife Refuge Complex Office	Las Vegas	NV
Ms.	Jennifer		Olsen		Southern Nevada Regional Planning Coalition, Clark County Clearinghouse	Henderson	NV

American Indians

Prefix	***First***	***MI***	***Last***	***Title***	***Organization Name***	***City***	***State***
Recipients of IICEP and NEPA Documents							
Mr.	Richard		Arnold	Tribal Chairman	Pahrump Paiute Tribe	Pahrump	NV
Mr.	Felton		Bricker	Tribal Representative	Fort Mojave Tribe	Mohave Valley	AZ
Ms	Vivienne		Caron-Jake	Tribal Representative	Kaibab Band of Southern Paiutes	Fredonia	AZ
Mr.	Maurice		Frank-Churchill	Tribal Representative	Yomba Shoshone Tribe	Duckwater	NV
Ms	Gaylene		Moose	Tribal Representative	Bishop Paiute Indian Tribe	Big Pine	CA

Chambers of Commerce

Organization Name	*City*	*State*
Beatty Chamber of Commerce	Beatty	NV
Boulder City Chamber of Commerce	Boulder City	NV
Tonopah Nevada Chamber of Commerce	Tonopah	NV
Henderson Chamber of Commerce	Henderson	NV
Las Vegas Chamber of Commerce	Las Vegas	NV
North Las Vegas Chamber of Commerce	North Las Vegas	NV
Asian Chamber of Commerce	Las Vegas	NV
Women's Chamber of Commerce of Nevada	Las Vegas	NV
Pahrump Valley Chamber of Commerce	Pahrump	NV
Amargosa Chamber of Commerce	Amargosa Valley	NV
Goldfield Chamber of Commerce	Goldfield	NV
Pioche Chamber of Commerce	Pioche	NV
Latin Chamber of Commerce	Las Vegas	NV

Libraries

Organization Name	***City***	***State***
Alamo Branch Library	Alamo	NV
Beatty Library District	Beatty	NV
Boulder City Library	Boulder City	NV
Caliente Branch Library	Caliente	NV
Nevada State Library and Archives Federal Publications	Carson City	NV
Indian Springs Library	Indian Springs	NV
James Dickinson Library	Las Vegas	NV
Las Vegas Library	Las Vegas	NV
North Las Vegas Library District Main Branch	North Las Vegas	NV
Pahrump Community Library	Pahrump	NV
Green Valley Library	Las Vegas	NV
Community College of Southern Nevada Library - Cheyenne Campus	North Las Vegas	NV
Business and Government Info. Center/322 - University of Nevada Libraries	Reno	NV
Tonopah Public Library	Tonopah	NV
Clark County Library	Las Vegas	NV
Sunrise Library	Las Vegas	NV
Lincoln County Library	Pioche	NV

ATTACHMENT F

SHPO Consultation

STATE OF NEVADA
DEPARTMENT OF CULTURAL AFFAIRS
Nevada State Historic Preservation Office
100 N. Stewart Street
Carson City, Nevada 89701
(775) 684-3448 • Fax (775) 684-3442
www.nvshpo.org

CEVN-

KENNY C. GUINN
Governor

SCOTT K. SISCO
Interim Director

RONALD M. JAMES
State Historic Preservation Officer

December 1, 2006

Eloisa V. Hopper
Chief, Environmental Flight
99 CES/CEV
4349 Duffer Drive, suite 1601
Nellis Air Force Base, NV 89191

Re: Report Titled 'Nellis Air Force Base (Nellis) – Historic Evaluation of Nine (9) Buildings (October 2006)' by Geo-Marine, Inc. and Determinations of Eligibility and Effect.

Dear Ms. Hopper:

Thank you for submitting the requested information. The Nevada State Historic Preservation Office (SHPO) has reviewed the subject undertaking for compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Nellis proposes the demolition and replacement of the following buildings:

#	Name	Location	Built
1	Building #250	Nellis AFB	1956
2	Building #258	Nellis AFB	1956
3	Building #264	Nellis AFB	1971
4	Building #265	Nellis AFB	1956
5	Building #415	Nellis AFB	1953
6	Building #839	Nellis AFB	1955
7	Building #841	Nellis AFB	1956
8	Building #941	Nellis AFB	1951
9	Building #67	Creech AFB	1952

Area of Potential Effect (APE) for Nellis AFB (formerly Las Vegas Army Airfield)

Based on the information included in "Figure 3 – Evaluated Buildings within Areas I and III of the main base of Nellis AFB", the SHPO accepts the outlined APE for the evaluation of Buildings 250, 258, 264, 265, 415, 839, 841, and 941. Subject buildings are located within an area containing a high number of buildings and/or structures built after 1962.

Area of Potential Effect (APE) for Creech AFB (formerly Indian Springs AFB)

Based on the information included in "Figure 4 – Evaluated Buildings at Creech AFB', the SHPO accepts the APE.

Determinations of Eligibility

The SHPO concurs with the following Nellis' determinations of eligibility for the subject buildings:

#	Name	Current Function	Built	Eligibility
1	Building #250	HQ, 64th and 65th Aggressor Squadron	1956	Not Eligible
2	Building #258	HQ, 57th Equipment Maintenance Squadron	1956	Not Eligible
3	Building #264	Weapons and Release Systems Shop	1971	Not Eligible
4	Building #265	Aircraft Maintenance Organizational Shop	1956	Not Eligible
5	Building #415	Aerospace Ground Equipment Facility	1953	Not Eligible
6	Building #839	Communication Facility (Laundry Facility)	1955	Not Eligible
7	Building #841	Base Cold Storage	1956	Not Eligible
8	Building #941	Pump Station, Liquid Fuel	1951	Not Eligible
9	Building #67	Administration Building	1952	Not Eligible

Determinations of Effect

The SHPO concurs with Nellis' determination of 'No Adverse Effect' for the subject undertaking.

If you have any questions, please contact me at 775-684-3444 or Rebecca R. Ossa, Architectural Historian at 775-687-3441 or via email at: rrossa@clan.lib.nv.us.

Sincerely,

Alice M Baldrica

Alice M. Baldrica, Deputy
State Historic Preservation Officer

ATTACHMENT G

Clark County Department of Air Quality Consultation

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

16 January 2008

Clark County Department of Air Quality and Environmental Management
500 S Grand Central Pkwy
PO Box 555210
Las Vegas, NV 89155-5210

Dear Mr. Deyo,

Please consider this our formal request to include nitrogen oxide (NO_x) emissions from the proposed F-35 beddown at Nellis AFB, Nevada, in Clark County's upcoming State Implementation Plan (SIP) revision for ozone. As was discussed between representatives of Nellis AFB, Clark County Dept of Air Quality and Environmental Management, and Headquarters Air Combat Command, the County may be able to accommodate the additional 185 tons of NO_x which would be emitted per year, as part of Clark County's Ozone SIP revision to meet National Ambient Air Quality Standard compliance. This would allow the AF to comply with General Conformity requirements, as outlined in Section 176(c) of the Clean Air Act, as well as demonstrating conformity under 40 CFR 93.158(a)(1). We request that you provide us with formal confirmation that this accommodation can be made.

The proposed beddown of F-35 aircraft would begin in 2009, with construction continuing through 2014. The first aircraft would arrive in 2012, and conclude in 2022 with a total of 36 F-35. NO_x emissions would remain below de minimis levels per year, until the aircraft number reaches 24, expected in 2017, increasing NO_x emissions to 125 tons/year. By 2022, NO_x emissions generated either directly or indirectly from the proposed beddown would be 185 tons per year. We have attached a general spreadsheet which illustrates the projected emissions per year for all criteria pollutants associated with the proposed beddown. Should the projected emissions increase or decrease based on revised engine emission data, our environmental analysis would be updated, with your coordination.

HQ ACC point of contact for this conformity determination is Ms. Sheryl K. Parker. She may be contacted at 757.764.9334 if you have any questions pertaining to this request.

Bruce W. MacDonald

BRUCE W. MACDONALD, P.E.
Headquarters Air Combat Command
Chief, Programs Division

Attachment:
F-35 Proposed Emissions

F-35 Beddown TOTAL Air Emissions
Tons/Year
Includes construction, commuting, and operational emissions

2009

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.12	0.50	1.19	0.13	1.21	0.18

2010

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.90	5.29	6.26	0.67	3.90	0.75

2011

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
0.59	2.78	5.50	0.61	4.26	0.73

2012

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
2.23	24.80	31.81	1.24	8.20	8.20

2013

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.15	28.36	39.57	2.12	22.31	10.02

2014

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
3.10	31.73	34.46	1.48	9.62	8.48

2015

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
4.36	49.64	62.51	3.49	17.39	17.39

2017

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
7.38	86.80	123.69	6.97	34.71	34.71

2022

VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$
10.40	123.96	184.87	9.45	51.03	51.03

MEMORANDUM

Department of Air Quality and Environmental Management

Lewis Wallenmeyer
Director

TO: Sheryl K. Parker, Environmental Analysis Project Manager, HQ ACC/A7PS

FROM: Stephen Deyo, Assistant Planning Manager, Clark County DAQEM

SUBJECT: Carbon Monoxide Conformity for Nellis AFB

DATE: August 25, 2009

Dear Ms. Parker,

After internal discussions, the Department of Air Quality and Environmental Management (DAQEM) has determined not to require Nellis Air Force Base to conduct local air quality modeling as part of its general conformity analysis for Carbon Monoxide (CO) for its proposed F-35 project.

DAQEM utilized a 1-kilometer grid spacing over the entire Las Vegas Valley in its UAM modeling analysis of the 8-hour, 9 ppm CO standard. This modeling, which included emissions from the F-35 project, has already been submitted to EPA as part of DAQEM's CO Maintenance Plan. In that analysis, no modeled area within the Valley is in excess of the standard. In addition, no receptor grid near Nellis Air Force Base is greater than 5 ppm. The emissions of the F-35 project are a very small portion of the CO emissions inventory for the Las Vegas Valley, and there is no indication that additional modeling or hot-spot analysis is necessary.

The technical support document of DAQEM's CO Maintenance Plan is available on our Web site:

http://www.accessclarkcounty.com/depts/daqem/aq/planning/Documents/CO/COSIP2008/CO_MaintenacePlanTechnicalSupportDocument.pdf

Please note figure 3-3 on page 3-5 in particular for predicted 8-hour maximum CO concentrations (ppm) in the Las Vegas Valley, inclusive of area controlled by Nellis Air Force Base.

Please contact me if you have any questions.

Stephen Deyo
Assistant Planning Manager
DAQEM
(702) 455-1675

DAQEM

DEPARTMENT OF AIR QUALITY & ENVIRONMENTAL MANAGEMENT
500 S Grand Central Parkway 1st Floor · Box 555210 · Las Vegas, NV 89155-5210
(702) 455-5942 · Fax (702) 383-9994
Lewis Wallenmeyer Director · Tina Gingras Assistant Director

December 29, 2009

Ms. Sheryl Parker
HQ ACC/A7PS
129 Andrews Street, Suite 337
Langley AFB, VA 23665-2769

RE: F-35 Force Development Evaluation and Weapons School Beddown Draft General Conformity Determination

Dear Ms. Parker:

The Clark County Department of Air Quality and Environmental Management reviewed the Draft General Conformity Determination, and we concur with the finding of conformity. We participated in the development of this document. We have no further comments.

Thank you for the opportunity to review this document. If you have any questions, please contact me at 702-455-1600.

Sincerely,

L. Wallenmeyer

Lewis Wallenmeyer
Director

12/10/09

Concerning the issue, of basing upto 36, F-35A aircraft, at Nellis Air Base, will have much more, to do with NOISE - than with the Clean Air Act!

Granted, Air Quality is very important, and will certainly come into Play here, as it should!

But understand, the F-35, with, it's 40,000 Lb. thrust Engine - is 4 times more noisy, than your standard fighter jet today!

The F-35 development, was a many Nation project. Some foreign nations are, (at least have) given serious consideration, to Cancelling their order for these new planes, because the way they deploy their aircraft - would make the noise factor unbearable!

I think you will see one of two things take place here.

Either the aircraft will be based, out of Creech Air Base - North of Las Vegas, or they will be Limited to a Low Power setting around Las Vegas. Even then, they are a problem!

You will see what I am talking about. I can only now imagine, the Possible Legal, Litigation, issues, which will arise, related to this deployment - if it goes thru! (ongoing health issues)

DAQEM

DEPARTMENT OF AIR QUALITY & ENVIRONMENTAL MANAGEMENT
500 S Grand Central Parkway 1st Floor · Box 555210 · Las Vegas, NV 89155-5210
(702) 455-5942 · Fax (702) 383-9994
Lewis Wallenmeyer Director · Tina Gingras Assistant Director

October 20, 2009

Mr. Leo M. Drozdoff, P.E., Administrator
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

Re: Commitment to Submit State Implementation Plan ("SIP") for Clark County, Nevada to Support a Conformity Determination for the Beddown of the F-35 Force Development Evaluation and Weapons School at Nellis AFB, Nevada ("Nellis F-35 Program")

Dear Mr. Drozdoff:

The purpose of this letter is to affirm that the Clark County Board of Commissioners ("Board") in its capacity as the air pollution control agency of Clark County, as designated by the Governor of the State of Nevada and in accordance with the Nevada Revised Statutes ("NRS") 445B.500, commits to submit an Ozone Maintenance SIP to the Nevada Division of Environmental Protection ("NDEP") for submittal to EPA which will accommodate all NOx emissions from the above F-35 beddown at Nellis AFB, NV. See attached emissions table from Nellis' draft conformity determination in support of the requirements of 40 CFR 93.158(a)(5)(i)(B)(5). The Clark County Department of Air Quality and Environmental Management ("DAQEM") requests that NDEP, as the Governor's designee for SIP actions, endorse and forward this commitment letter and related attachments to EPA consistent with the procedural requirements of 40 CFR 93.158(a)(5)(i)(B).

The Board has designated the director of DAQEM as the Control Officer who, along with DAQEM staff, implements and enforces the Clean Air Act ("Act") through the Clark County Air Quality Regulations, which are adopted by the authority under the Act (42 USC §§7401-7671q) and the Nevada Revised Statutes (NRS §§445B.100-.895). In addition, DAQEM is responsible for developing and implementing SIP requirements applicable to Clark County in accordance with 42 USC § 7410.

Pursuant to 40 C.F.R. § 93.158(a)(5)(i)(B) and consistent with guidance issued by the Environmental Protection Agency ("EPA") on October 19, 1994, the Board commits to adopt and to submit via the Administrator of NDEP a Maintenance Plan for ozone no later than 18 months after October 6, 2009 to the EPA. (See attached Board approval). While the Board recognizes that there is no approved SIP for ozone in Clark County at this time, the Board makes this commitment to include the Nellis F-35 Program emissions consistent with EPA Guidance on General Conformity implementation issued October 19, 1994 and the Airport General Conformity guidance issued in September 2002.

DAQEM enforces all sections of the Clark County Air Quality Regulations, as applicable. Sections 0, 12 and 55 of the Clark County Air Quality Regulations include ozone precursor regulations. Sections 0 and 12 have been submitted to EPA and approved for inclusion in the SIP, and Section 55 is locally enforceable only. As part of New Source Review Reform, Clark County will submit a comprehensive set of regulations for inclusion in the SIP which will include preconstruction and authority to operate provisions for all applicable pollutants, including ozone precursors. Clark County intends to make this submittal in 2009.

Clark County has met the attainment criteria for the 1997 Ozone Standard. The Clark County Ozone Maintenance Plan will have no additional SIP measures beyond the Clark County Air Quality Regulations and the State of Nevada's vehicle Inspection and Maintenance (I/M) Program. In developing a SIP emissions inventory for the Maintenance Plan required by 42 USC § 7505a, DAQEM will include an allowance for 200 tons per year of NOx emissions for new operations which will cover the Nellis F-35 Program emissions.

Clark County has determined that, given the nature of the Nellis F-35 Program, no mitigation measures will be required by the Air Force for this commitment to be fulfilled. The emissions from the Nellis F-35 Program will be accounted for in the SIP that Clark County will prepare for the Maintenance Plan, which will be submitted no later than 18 months after October 6, 2009.

Please contact Stephen Deyo at (702) 455-1675 or DEYO@co.clark.nv.us should you have any questions on this matter.

L. Wallenmeyer
Lewis Wallenmeyer
Director

Attachments

cc: Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health (SAF/IEE)

November 16, 2009

Laura Yoshii
Acting Regional Administrator
OAR-1, USEPA Region IX
75 Hawthorne Street
San Francisco, CA 94105

Dear Ms. Yoshii:

On behalf of Governor Gibbons, as his appointed designee, the Nevada Division of Environmental Protection (NDEP) is forwarding the enclosed commitment letter with attachments from the Clark County Department of Air Quality and Environmental Protection (DAQEM). Through the enclosed letter DAQEM is affirming that the Clark County Board of Commissioners has authorized DAQEM to prepare and submit an ozone maintenance plan for U.S. EPA approval which will accommodate all NO_x emissions from the F-35 Beddown project at Nellis Air Force Base. This method of demonstrating general conformity for this project with the Nevada state implementation plan was developed with U.S. EPA Region IX assistance.

If you should have any questions about this submittal or require additional clarification, please refer to the enclosed letter from DAQEM for contact information.

Sincerely,

Leo M. Drozdoff

Leo M. Drozdoff, P.E.
Administrator

Enclosure

cc: Robin Reedy, Chief of Staff, Office of the Governor
Allen Biaggi, Director, DCNR
Colleen Cripps, Deputy Administrator, NDEP
Michael Elges, Chief, Bureau of Air Pollution Control, NDEP
Greg Remer, Chief, Bureau of Air Quality Planning, NDEP
Lewis Wallenmeyer, Director, DAQEM, Clark County
Tina Gingras, Assistant Director, DAQEM, Clark County
Jefferson Wehling, EPA Region IX, ORC-2 (w/enclosure)
Karina O'Connor, EPA Region IX, AIR-2 (w/enclosure)

Certified Mail No. 7008 1140 0004 4031 2485

From:	Parker, Sheryl K Civ USAF HQ AF ACC/A7PS
To:	Rose, Kathy L; Hoffman, Charee
Subject:	FW: Nellis AFB F-35 Beddown and Weapons School Draft General Conformity Determination
Date:	Monday, March 08, 2010 9:37:55 AM

These were the EPA comments on the draft conformity determination.

-----Original Message-----
From: Kelly.Johnj@epamail.epa.gov [mailto:Kelly.Johnj@epamail.epa.gov]
Sent: Thursday, January 14, 2010 7:59 PM
To: Parker, Sheryl K Civ USAF HQ AF ACC/A7PS
Cc: Wehling.Jefferson@epamail.epa.gov; Hanf.Lisa@epamail.epa.gov; OConnor.Karina@epamail.epa.gov
Subject: Nellis AFB F-35 Beddown and Weapons School Draft General Conformity Determination

Hi Sheryl - Thanks for the inquiry about our input on the general conformity proposed determination. If you received any public comments and would like to discuss those or our thoughts below, please let us know. We'd be glad to assist. Regards, John

(1) ES-3 identifies a maintenance plan requirement where there is none, i.e., absent a redesignation request, which is also not a requirement. A nonattainment area may stay nonattainment as long as it wants. However, section 175A of the Act does require a maintenance plan when a State decides to request redesignation to attainment. The subject sentence [need cite] could be revised as follows: "DAQEM and the State of Nevada have issued a commitment to include the NOx emissions in the maintenance implementation plan that DAQEM and the State intend to must submit pursuant to the provisions of 42 U.S.C. (section) 7505a in connection with a redesignation to attainment request under 42 U.S.C. (section) 7407(d)."

(2) We note that the Air Force's reliance on the state's commitment to submit a SIP revision (effective upon the date of the final conformity determination) will trigger an 18-month deadline for submittal of a SIP revision, which is anticipated to be an 8-hour ozone maintenance plan. No suggested edit.

(3) a. Noting that year 2022 is the highest PM emissions year, we expect that fugitive dust emissions (which would be highest in 2013) take into account control measures, whereas aircraft PM emissions (which would be highest in 2022) are uncontrolled. The conformity determination should clarify and confirm this, if correct.

b. We couldn't confirm that fugitive dust emissions from tire wear and re-entrained road dust (construction worker vehicle trips and project-related commute trips), and fugitive emissions from tire wear from aircraft landings were included in emissions estimates. We suggest either adding such analysis or explaining how it is already included, if that is the case. If, for example, tire wear emissions and re-entrained road dust are not included in your MOBILE modeling results, these emissions should be estimated and added to the MOBILE results. PM numbers would certainly increase, but we do not anticipate the increase would be so large as to cause de minimis levels for PM to be exceeded.

c. The General Conformity determination should identify the Clark

County rules to which the project would be subject and that can thus be relied upon to reduce construction-related PM and VOC emissions. These rules include Clark County Air Pollution Regulations Section 94 - Permitting and Dust Control for Construction Activities, and Section 60.4 - Cutback Asphalts.

(4) On page 22, the GC determination cites 40 CFR 51.858 as the criterion for determining conformity for CO. To the contrary, we understand the Air Force would be relying on 40 CFR 93.158(a)(4)(ii) and related Clark County DAQEM CO (areawide) modeling results from the submitted (but not yet approved) CO Maintenance Plan. If correct, then DAQEM's email (dated 8/21/09 from S. Deyo to Sheryl Parker) documenting the decision by DAQEM not to require the Air Force to conduct local CO modeling but to rely on DAQEM's own areawide CO modeling should be included along with the commitment letters at the back of the report.

APPENDIX B
AIRCRAFT OPERATIONS

APPENDIX B
AIRCRAFT OPERATIONS

1.0 INTRODUCTION

The following tables provide details on baseline and projected NTTR sortie-operations and Nellis AFB airfield operations..

- Table B-1 summarizes sortie-operations for the two MOAs and four restricted areas. It compares low-use and high-use scenarios for both baseline and projected conditions.
- Tables B-2 and B-3 provide a breakdown of baseline sortie-operations by aircraft type and within subdivisions of the airspace units. Table B-3 shows the high-end (300,000 sortie-operations). These data reflect conditions described in the beddown EIS for the F-22 at Nellis AFB in 1999.
- Tables B-4 and B-5 provide a breakdown of projected sortie-operations by aircraft type and within subdivision of the airspace units. Table B-4 depicts the lower end of the range (251,840 sortie-operations). Table B-2 shows the high-end (351,840 sortie-operations).
- Table B-6 outlines projected Nellis AFB airfield operations by aircraft and Table B-7 presents the type and number of operations on the flight tracks.

Table B-1 Projected Sortie-Operations Within the Airspace Under the Proposed Action

	Baseline		***F-35 Sortie-Operations***	***Projected***		***Percent Change***	
	200,000 Scenario	*300,000 Scenario*		*251,840+ Scenario*	*351,840+ Scenario*	*251,840+ Scenario*	*351,840+ Scenario*
Desert MOA	51,224	76,170	15,480	66,704	91,650	30%	20%
Reveille MOA	14,038	20,912	4,270	18,308	25,181	30%	20%
R-4806	30,134	44,135	4,322	34,456	48,457	14%	10%
R-4807	74,128	112,122	19,683	93,810	131,804	27%	18%
R-4808	12,952	20,007	3,368	16,321	23,376	26%	17%
R-4809	17,524	26,655	4,717	22,242	31,372	27%	18%
Total	**200,000**	**300,000**	**51,840**	**251,840**	**351,840**	**26%**	**17%**

Table B-2 Baseline Distribution by Aircraft Type and Subdivision – 200,000 Sortie-Operations Annually

		AV-8	*A-10*	*B-1*	*B-2*	*B-52*	*C-130*	*C-141*	*E-3*	*EA-6G*	*F-14*	*F-15*	*F-16*	*F-18*	*F-22*	*F-117*	*KC-10*	*KC-135*	*Mirage*	*Small Prop*	*Tornado*	*Helos*	*Predator*	*Other*	*Airspace Subunit Total*
Desert MOA																									
	Caliente	138	69	54	10	9	836	101	161	471	31	4,761	11,232	948	3,559	26	26	883	333	54	5	250		65	24,022
	Coyote	104	83	38	7	7	419	50	1	235	18	2,797	6,819	533	2,091	16	13	444	225	26	45	225		41	14,236
	Eglin	120	92	19	3	5	417	51	2	236	15	2,601	6,214	484	1,942	9	13	443	111	26	3	128		31	12,966
Total		362	244	111	20	21	1,672	202	164	942	64	10,159	24,265	1,965	7,592	51	52	1,770	669	106	53	603	-	137	51,224
Reveille MOA		102	71	38	7	7	419	50	1	235	17	2,801	6,668	530	2,094	17	13	443	225	30	47	181		42	14,038
R 4806																									
	R61	79	988	1	2	2	4				0	393	1,314	29	293	2		2		1		158	744	1	4,014
	R62	97	1,156	1	2	2	4				0	501	1,488	38	374	2		3		1		173	744	441	5,027
	R63	19	1,139	1		2	7				0	542	1,716	37	404	3		1				211	744	441	5,267
	R64	78	1,164	1	2	2	5				0	449	1,505	40	334	2		1				188	744	1,102	5,617
	R65	81	1,189	1	2	2	8				0	458	2,858	36	342	2		2		8		177	744	441	6,351
	Alamo	97	1,148	1	2	2	5				0	501	1,504	45	373	2		2				176		-	3,858
Total		451	6,784	4	10	14	33	-	-	-	1	2,844	10,385	225	2,120	13	-	11	-	10	-	1,083	3,720	2,426	30,134
R 4807																									
	EC South	27	526	7	1	2	1				5	875	3,214	125	653	3		3	25	2	46	85		450	6,050
	Pahute Mesa	22	149	4	1	2	1				4	995	2,849	128	741			1				70		231	5,197
	R71	66	517	20	3	5				1	11	1,478	4,806	286	1,104	9		3	114		43	62		627	9,154
	R74	150	123	60	13	9	1		1		27	3,989	9,732	782	2,984	28		2	380	347	47	954		629	20,260
	R75	132	212	47	10	8	1			1	22	3,353	8,473	642	2,508	21		2	291	347	41	947		644	17,702
	R76	126	559	46	9	8	1				22	2,726	7,914	605	2,040	22		3	291	347	46	104		896	15,765
Total		523	2,086	184	37	34	5	-	1	2	92	13,416	36,988	2,568	10,030	83	-	14	1,101	1,043	223	2,222	-	3,477	74,128
R 4808																									
	R4808W	73	189	23	4	4	2				12	1,907	5,019	340	1,425	10		3	133		4	76		445	9,668
	R4808E			-		0					-	305	434		227						41	1,174		1,103	3,284
Total		73	189	23	4	4	2	-	-	-	12	2,211	5,453	340	1,652	10	-	3	133	-	45	1,250	-	1,548	12,952
R 4809			2									114	266		85					347		441		661	1,916
	EC East	42	134	14	4	4	1				8	1,612	4,198	239	1,203	5		2	69	347	46	97		10	8,035
	EC West	45	149	11	2	3	1		1		7	1,373	3,893	198	1,024	3		1	47		46	100		671	7,574
Total		87	285	25	6	6	2	-	1	-	15	3,099	8,357	437	2,312	8	-	3	116	694	92	638	-	1,342	17,524
	TOTAL	**1,598**	**9,659**	**385**	**84**	**85**	**2,133**	**252**	**167**	**1,179**	**200**	**34,530**	**92,116**	**6,065**	**25,800**	**182**	**65**	**2,244**	**2,244**	**1,883**	**460**	**5,977**	**3,720**	8,972	**200,000**

Table B-3 Baseline Distribution by Aircraft Type and Subdivision – 300,000 Sortie-Operations

		AV-8	*A-10*	*B-1*	*B-2*	*B-52*	*C-130*	*C-141*	*E-3*	*EA-6G*	*F-14*	*F-15*	*F-16*	*F-18*	*F-22*	*F-117*	*KC-10*	*KC-135*	*Mirage*	*Small Prop*	*Tornado*	*Helos*	*Predator*	*Other*	*Subunit Total*
Desert MOA																									
	Caliente	207	103	325	16	58	1,254	151	243	707	186	8,163	16,849	1,421	3,559	40	39	1,325	500	81	8	374		128	35,737
	Coyote	156	125	226	9	43	628	75	1	353	105	4,794	10,228	800	2,091	25	20	665	337	39	68	337		81	21,206
	Eglin	179	139	116	5	29	626	75	3	353	90	4,459	9,320	725	1,942	14	20	665	167	39	5	193		62	19,227
Total		542	367	668	30	129	2,508	301	247	1,413	382	17,416	36,397	2,946	7,592	79	79	2,655	1,004	159	81	904	-	271	76,170
Reveille MOA		154	107	228	10	41	628	75	1	353	102	4,802	10,002	795	2,094	26	20	665	337	47	70	272		82	20,912
R 4806																									
	R61	118	1,483	4	3	14	7				1	674	1,971	44	293	3		3		1		237	744	2	5,603
	R62	146	1,736	4	3	14	7				1	860	2,233	57	374	3		4		1		259	744	875	7,321
	R63	29	1,708	4		-	10				1	929	2,574	56	404	4		1				316	744	875	7,655
	R64	117	1,746	4	3	14	8				0	770	2,257	60	334	3		1				282	744	2,189	8,532
	R65	121	1,780	4	3	14	12				0	785	4,285	55	342	3		3		12		265	744	875	9,303
	Alamo	146	1,721	3	3	14	8				0	858	2,256	68	373	3		3				264			5,721
Total		677	10,174	23	15	70	52	-	-	-	5	4,876	15,576	340	2,120	19	-	15	-	14	-	1,623	3,720	4,816	44,135
R 4807																									
	EC South	41	788	40	1	15	1				32	1,499	4,822	187	653	4		4	37	3	69	128		892	9,215
	Pahute Mesa	33	224	21	1	9	1				25	1,705	4,274	191	741			1				105		458	7,789
	R71	99	776	118	5	28				1	66	2,533	7,209	429	1,104	14		4	170		65	92		1,244	13,957
	R74	225	184	362	18	60	1		1		164	6,839	14,598	1,173	2,984	42		3	570	520	69	1,431		1,249	30,492
	R75	198	318	283	15	49	1			1	134	5,748	12,709	962	2,508	32		3	437	520	61	1,421		1,278	26,677
	R76	189	839	277	14	50	1				134	4,673	11,871	908	2,040	33		4	437	520	69	156		1,777	23,991
Total		785	3,129	1,102	54	210	5	-	1	2	553	22,997	55,483	3,850	10,030	125	-	19	1,651	1,563	333	3,333	-	6,897	112,122
R 4808																									
	R4808W	110	284	137	8	24	3				72	3,270	7,528	511	1,425	15		4	200		7	114		882	14,594
	R4808E			-		-					-	522	651		227						61	1,762		2,190	5,413
Total		110	284	137	8	24	3	-	-	-	72	3,792	8,179	511	1,652	15	-	4	200	-	68	1,876	-	3,072	20,007
R 4809			3	-		-					-	196	399		85					520		661		1,312	3,176
	EC East	63	201	86	6	22	1				48	2,763	6,297	359	1,203	7		3	107	520	69	146		19	11,920
	EC West	67	224	63	3	17	1		1		39	2,353	5,840	296	1,024	5		1	71	3	69	150		1,332	11,559
Total		130	428	149	9	39	2	-	1	-	87	5,312	12,536	655	2,312	12	-	4	178	1,043	138	957	-	2,663	26,655
	TOTAL	**2,398**	**14,489**	**2,307**	**126**	**513**	**3,198**	**376**	**250**	**1,768**	**1,202**	**59,195**	**138,173**	**9,097**	**25,800**	**276**	**99**	**3,362**	**3,370**	**2,826**	**690**	**8,965**	**3,720**	**17,801**	**300,000**

Table B-4 Projected Distribution by Aircraft Type and Subdivision – 251,840 Sortie-Operations

		AV-8	*A-10*	*B-1*	*B-2*	*B-52*	*C-130*	*C-141*	*E-3*	*EA-6G*	*F-14*	*F-15*	*F-16*	*F-18*	*F-22*	*F-35*	*F-117*	*KC-10*	*KC-135*	*Mirage*	*Small Prop*	*Tornado*	*Helos*	*Predator*	*Other*	*Airspace Subunit Total*
Desert MOA																										
	Caliente	138	69	54	10	9	836	101	161	471	31	4,761	11,232	948	3,559	7,256	26	26	883	333	54	5	250		65	31,279
	Coyote	104	83	38	7	7	419	50	1	235	18	2,797	6,819	533	2,091	4,264	16	13	444	225	26	45	225		41	18,499
	Eglin	120	92	19	3	5	417	51	2	236	15	2,601	6,214	484	1,942	3,960	9	13	443	111	26	3	128		31	16,926
Total		362	244	111	20	21	1,672	202	164	942	64	10,159	24,265	1,965	7,592	15,480	51	52	1,770	669	106	53	603	-	137	66,704
Reveille MOA		102	71	38	7	7	419	50	1	235	17	2,801	6,668	530	2,094	4,270	17	13	443	225	30	47	181		42	18,308
R 4806																										
	R61	79	988	1	2	2	4				0	393	1,314	29	293	598	2		2		1		158	744	1	4,611
	R62	97	1,156	1	2	2	4				0	501	1,488	38	374	762	2		3		1		173	744	441	5,790
	R63	19	1,139	1		2	7				0	542	1,716	37	404	824	3		1				211	744	441	6,091
	R64	78	1,164	1	2	2	5				0	449	1,505	40	334	680	2		1				188	744	1,102	6,297
	R65	81	1,189	1	2	2	8				0	458	2,858	36	342	697	2		2		8		177	744	441	7,048
	Alamo	97	1,148	1	2	2	5				0	501	1,504	45	373	761	2		2				176		-	4,619
Total		451	6,784	4	10	14	33	-	-	-	1	2,844	10,385	225	2,120	4,322	13	-	11	-	10	-	1,083	3,720	2,426	34,456
R 4807																										
	EC South	27	526	7	1	2	1				5	875	3,214	125	653	1,332	3		3	25	2	46	85		450	7,382
	Pahute Mesa	22	149	4	1	2	1				4	995	2,849	128	741	1,511			1				70		231	6,708
	R71	66	517	20	3	5				1	11	1,478	4,806	286	1,104	2,251	9		3	114		43	62		627	11,405
	R74	150	123	60	13	9	1		1		27	3,989	9,732	782	2,984	6,085	28		2	380	347	47	954		629	26,345
	R75	132	212	47	10	8	1			1	22	3,353	8,473	642	2,508	4,344	21		2	291	347	41	947		644	22,046
	R76	126	559	46	9	8	1				22	2,726	7,914	605	2,040	4,160	22		3	291	347	46	104		896	19,925
Total		523	2,086	184	37	34	5	-	1	2	92	13,416	36,988	2,568	10,030	19,683	83	-	14	1,101	1,043	223	2,222	-	3,477	93,810
R 4808																										
	R4808W	73	189	23	4	4	2				12	1,907	5,019	340	1,425	2,906	10		3	133		4	76		445	12,574
	R4808E			-		0					-	305	434		227	463						41	1,174		1,103	3,747
Total		73	189	23	4	4	2	-	-	-	12	2,211	5,453	340	1,652	3,368	10	-	3	133	-	45	1,250	-	1,548	16,321
R 4809			2									114	266		85	174					347		441		661	2,090
	EC East	42	134	14	4	4	1				8	1,612	4,198	239	1,203	2,453	5		2	69	347	46	97		10	10,488
	EC West	45	149	11	2	3	1		1		7	1,373	3,893	198	1,024	2,091	3		1	47		46	100		671	9,664
Total		87	285	25	6	6	2	-	1	-	15	3,099	8,357	437	2,312	4,717	8	-	3	116	694	92	638	-	1,342	22,242
	TOTAL	**1,598**	**9,659**	**385**	**84**	**85**	**2,133**	**252**	**167**	**1,179**	**200**	34,530	**92,116**	**6,065**	**25,800**	**51,840**	**182**	**65**	**2,244**	**2,244**	**1,883**	**460**	**5,977**	**3,720**	8,972	**251,840**

Table B-5 Projected Distribution by Aircraft Type and Subdivision – 351,840 Sortie-Operations

		AV-8	*A-10*	*B-1*	*B-2*	*B-52*	*C-130*	*C-141*	*E-3*	*EA-6G*	*F-14*	*F-15*	*F-16*	*F-18*	*F-22*	*F-35*	*F-117*	*KC-10*	*KC-135*	*Mirage*	*Small Prop*	*Tornado*	*Helos*	*Predator*	*Other*	*Airspace Subunit Total*
Desert MOA																										
	Caliente	207	103	325	16	58	1,254	151	243	707	186	8,163	16,849	1,421	3,559	7,256	40	39	1,325	500	81	8	374		128	42,993
	Coyote	156	125	226	9	43	628	75	1	353	105	4,794	10,228	800	2,091	4,264	25	20	665	337	39	68	337		81	25,470
	Eglin	179	139	116	5	29	626	75	3	353	90	4,459	9,320	725	1,942	3,960	14	20	665	167	39	5	193		62	23,187
Total		542	367	668	30	129	2,508	301	247	1,413	382	17,416	36,397	2,946	7,592	15,480	79	79	2,655	1,004	159	81	904	-	271	91,650
Reveille MOA		154	107	228	10	41	628	75	1	353	102	4,802	10,002	795	2,094	4,270	26	20	665	337	47	70	272		82	25,181
R 4806																										
	R61	118	1,483	4	3	14	7				1	674	1,971	44	293	598	3		3		1		237	744	2	6,200
	R62	146	1,736	4	3	14	7				1	860	2,233	57	374	762	3		4		1		259	744	875	8,083
	R63	29	1,708	4		-	10				1	929	2,574	56	404	824	4		1				316	744	875	8,479
	R64	117	1,746	4	3	14	8				0	770	2,257	60	334	680	3		1				282	744	2,189	9,212
	R65	121	1,780	4	3	14	12				0	785	4,285	55	342	697	3		3		12		265	744	875	10,000
	Alamo	146	1,721	3	3	14	8				0	858	2,256	68	373	761	3		3				264			6,482
Total		677	10,174	23	15	70	52	-	-	-	5	4,876	15,576	340	2,120	4,322	19	-	15	-	14	-	1,623	3,720	4,816	48,457
R 4807																										
	EC South	41	788	40	1	15	1				32	1,499	4,822	187	653	1,332	4		4	37	3	69	128		892	10,547
	Pahute Mesa	33	224	21	1	9	1				25	1,705	4,274	191	741	1,511			1				105		458	9,300
	R71	99	776	118	5	28				1	66	2,533	7,209	429	1,104	2,251	14		4	170		65	92		1,244	16,208
	R74	225	184	362	18	60	1		1		164	6,839	14,598	1,173	2,984	6,085	42		3	570	520	69	1,431		1,249	36,578
	R75	198	318	283	15	49	1			1	134	5,748	12,709	962	2,508	4,344	32		3	437	520	61	1,421		1,278	31,021
	R76	189	839	277	14	50	1				134	4,673	11,871	908	2,040	4,160	33		4	437	520	69	156		1,777	28,151
Total		785	3,129	1,102	54	210	5	-	1	2	553	22,997	55,483	3,850	10,030	19,683	125	-	19	1,651	1,563	333	3,333	-	6,897	131,804
R 4808																										
	R4808W	110	284	137	8	24	3				72	3,270	7,528	511	1,425	2,906	15		4	200		7	114		882	17,500
	R4808E			-		-					-	522	651		227	463						61	1,762		2,190	5,876
Total		110	284	137	8	24	3	-	-	-	72	3,792	8,179	511	1,652	3,368	15	-	4	200	-	68	1,876	-	3,072	23,376
R 4809			3	-		-					-	196	399		85	174					520		661		1,312	3,349
	EC East	63	201	86	6	22	1				48	2,763	6,297	359	1,203	2,453	7		3	107	520	69	146		19	14,373
	EC West	67	224	63	3	17	1		1		39	2,353	5,840	296	1,024	2,091	5		1	71	3	69	150		1,332	13,650
Total		130	428	149	9	39	2	-	1	-	87	5,312	12,536	655	2,312	4,717	12	-	4	178	1,043	138	957	-	2,663	31,372
	TOTAL	**2,398**	**14,489**	**2,307**	**126**	**513**	**3,198**	**376**	**250**	**1,768**	**1,202**	**59,195**	**138,173**	**9,097**	**25,800**	**51,840**	**276**	**99**	**3,362**	**3,370**	**2,826**	**690**	**8,965**	**3,720**	**17,801**	351,840

APPENDIX C
NOISE

APPENDIX C
NOISE MODELING

Introduction

Appendix C provides a general noise primer to educate the reader on what constitutes noise, how it is measured, and the studies that were used in support of how and why noise is modeled.

Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects.

Section C1.0 of this appendix describes how sound is measured and summarizes noise impacts in terms of community acceptability and land use compatibility. Section C2.0 gives detailed descriptions of the effects of noise that lead to the impact guidelines presented in Section C1.0. Section C3.0 provides a description of the specific methods used to predict aircraft noise, including a detailed description of sonic booms.

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C1.0 NOISE DESCRIPTORS AND IMPACT

Aircraft operating in military airspace generate two types of sound. One is "subsonic" noise, which is continuous sound generated by the aircraft's engines and also by air flowing over the aircraft itself. The other is sonic booms (where authorized for supersonic), which are transient impulsive sounds generated during supersonic flight. These are quantified in different ways.

Section 1.1 describes the characteristics which are used to describe sound. Section 1.2 describes the specific noise metrics used for noise impact analysis. Section 1.3 describes how environmental impact and land use compatibility are judged in terms of these quantities.

C1.1 Quantifying Sound

Measurement and perception of sound involve two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or hertz (Hz).

Amplitude. The loudest sounds the human ear can comfortably hear have acoustic energy one trillion times the acoustic energy of sounds the ear can barely detect. Because of this vast range, attempts to represent sound amplitude by pressure are generally unwieldy. Sound is, therefore, usually represented on a logarithmic scale with a unit called the decibel (dB). Sound measured on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Because of the logarithmic nature of the decibel scale, sounds levels do not add and subtract directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that the combination of decibel values consists of first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The difference in dB between two sounds represents the ratio of the amplitudes of those two sounds. Because human senses tend to be proportional (i.e., detect whether one sound is twice as big as another) rather than absolute (i.e., detect whether one sound is a given number of pressure units bigger than another), the decibel scale correlates well with human response.

Under laboratory conditions, differences in sound level of 1 dB can be detected by the human ear. In the community, the smallest change in average noise level that can be detected is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound *intensity* but only a 50 percent decrease in perceived *loudness* because of the nonlinear response of the human ear (similar to most human senses).

The one exception to the exclusive use of levels, rather than physical pressure units, to quantify sound is in the case of sonic booms. As described in Section 3.2, sonic booms are coherent waves with specific characteristics. There is a long-standing tradition of describing individual sonic booms by the amplitude of the shock waves, in pounds per square foot (psf). This is particularly relevant when assessing structural effects as opposed to loudness or cumulative community response. In this environmental analysis, sonic booms are quantified by either dB or psf, as appropriate for the particular impact being assessed.

Frequency. The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz range. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (American National Standards Institute 1988). Sound levels that have been so adjusted are referred to as A-weighted sound levels.

The audible quality of high thrust engines in modern military combat aircraft can be somewhat different than other aircraft, including (at high throttle settings) the characteristic nonlinear crackle of high thrust engines. The spectral characteristics of various noises are accounted for by A-weighting, which approximates the response of the human ear but does not necessarily account for quality. There are other, more detailed, weighting factors that have been applied to sounds. In the 1950s and 1960s, when noise from civilian jet aircraft became an issue, substantial research was performed to determine what characteristics of jet noise were a problem. The metrics Perceived Noise Level and Effective Perceived

Noise Level were developed. These accounted for nonlinear behavior of hearing and the importance of low frequencies at high levels, and for many years airport/airbase noise contours were presented in terms of Noise Exposure Forecast, which was based on Perceived Noise Level and Effective Perceived Noise Level. In the 1970s, however, it was realized that the primary intrusive aspect of aircraft noise was the high noise level, a factor which is well represented by A-weighted levels and day-night average sound level (DNL). The refinement of Perceived Noise Level, Effective Perceived Noise Level, and Noise Exposure Forecast was not significant in protecting the public from noise.

There has been continuing research on noise metrics and the importance of sound quality, sponsored by the Department of Defense (DoD) for military aircraft noise and by the Federal Aviation Administration (FAA) for civil aircraft noise. The metric L_{dnmr}, which is described later and accounts for the increased annoyance of rapid onset rate of sound, is a product of this long-term research.

The amplitude of A-weighted sound levels is measured in dB. It is common for some noise analysts to denote the unit of A-weighted sounds by dBA. As long as the use of A-weighting is understood, there is no difference between dB or dBA: it is only important that the use of A-weighting be made clear. In this environmental analysis, A-weighted sound levels are reported as dB.

A-weighting is appropriate for continuous sounds, which are perceived by the ear. Impulsive sounds, such as sonic booms, are perceived by more than just the ear. When experienced indoors, there can be secondary noise from rattling of the building. Vibrations may also be felt. C-weighting (American National Standards Institute 1988) is applied to such sounds. This is a frequency weighting that is relatively flat over the range of human hearing (about 20 Hz to 20,000 Hz) that rolls off above 5,000 Hz and below 50 Hz. In this study, C-weighted sound levels are used for the assessment of sonic booms and other impulsive sounds. As with A-weighting, the unit is dB, but dBC is sometimes used for clarity. In this study, sound levels are reported in both A-weighting and C-weighting dBs, and C-weighted metrics are denoted when used.

Time Averaging. Sound pressure of a continuous sound varies greatly with time, so it is customary to deal with sound levels that represent averages over time. Levels presented as instantaneous (i.e., as might be read from the display of a sound level meter) are based on averages of sound energy over either 1/8 second (fast) or 1 second (slow). The formal definitions of fast and slow levels are somewhat complex, with details that are important to the makers and users of instrumentation. They may, however, be thought of as levels corresponding to the root-mean-square sound pressure measured over the 1/8-second or 1-second periods.

The most common uses of the fast or slow sound level in environmental analysis is in the discussion of the maximum sound level that occurs from the action, and in discussions of typical sound levels. Figure C-1 is a chart of A-weighted sound levels from typical sounds. Some (air conditioner, vacuum

cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period. A variety of noise metrics have been developed to describe noise over different time periods. These are described in Section 1.2.

C1.2 Noise Metrics

C1.2.1 Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or L_{Amax}. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleeping, or other common activities. Table C-1 reflects L_{max} values for typical aircraft associated with this assessment operating at the indicated flight profiles and power settings.

Table C-1. Representative Maximum Sound Levels (L_{max})

Aircraft (engine type)	*Power Setting*	*Power Unit*	*L_{max} Values (in dBA) At Varying Distances (In Feet)*				
			500	*1,000*	*2,000*	*5,000*	*10,000*
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	99.9	91.7	82.2	68.2	57.8
B-1	97.5%	RPM	126.5	118.3	109.9	98.3	88.7
F-15 (P220)	90%	NC	111.4	104.3	96.6	85	74.7
F-16 (P229)	93%	NC	113.7	106.2	98.1	86.1	75.7
F-22	100%	ETR	119.7	112.4	104.6	93	82.9
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97	88.9	78.8	60.2	46.4
B-1	90%	RPM	98.8	91.9	84.5	72.8	62
F-15 (P220)	75%	NC	88.5	81.6	74.3	63.2	53.4
F-16 (P229)	83.5%	NC	92.6	85.5	77.8	66.1	55.6
F-22	43%	ETR	111.3	103.9	95.9	83.9	73.1

Engine Unit of Power: RPM—Revolutions Per Minute; ETR—Engine Thrust Ratio; NC—Engine Core RPM; and NF—Engine Fan RPM. *Source*: SELCalc2 (Flyover Noise Calculator), Using Noisemap 6/7 and Maximum Omega10 Result as the defaults.

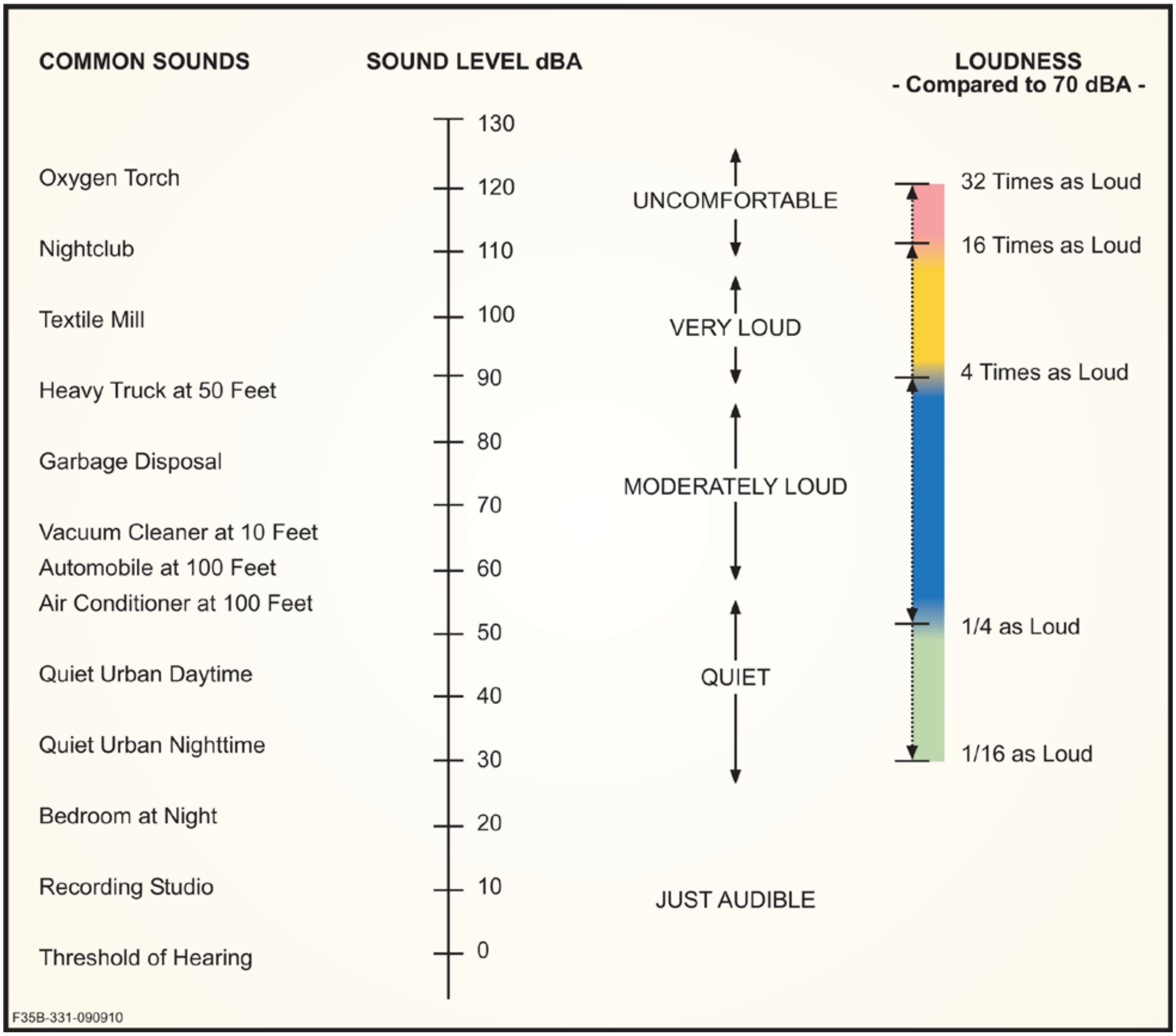


Figure C-1 Typical A-Weighted Sound Levels of Common Sounds
Source: Derived from the Handbook of Noise Control, Harris 1979, FICAN 1997

C1.2.2 Peak Sound Level

For impulsive sounds, the true instantaneous sound pressure is of interest. For sonic booms, this is the peak pressure of the shock wave, as described in Section 3.2 of this appendix. This pressure is usually presented in physical units of pounds per square foot. Sometimes it is represented on the decibel scale, with symbol Lpk. Peak sound levels do not use either A or C weighting.

C1.2.3 Sound Exposure Level

Individual time-varying noise events have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. Although the maximum sound

level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The Sound Exposure Level (abbreviated SEL or L_{AE} for A-weighted sounds) combines both of these characteristics into a single metric.

SEL is a composite metric that represents both the intensity of a sound and its duration. Mathematically, the mean square sound pressure is computed over the duration of the event, then multiplied by the duration in seconds, and the resultant product is turned into a sound level. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Table C-2 shows SEL values corresponding to the aircraft and power settings reflected in Table C-1.

Table C-2. Representative Sound Exposure Levels (SEL)

Aircraft (engine type)	*Power Setting*	*Power Unit*	*SEL Values (in dBA) At Varying Distances (In Feet)*				
			500	*1,000*	*2,000*	*5,000*	*10,000*
Takeoff/Departure Operations (at 300 knots airspeed)							
A-10A	6200	NF	102.6	96.2	88.5	76.9	68.3
B-1	97.5%	RPM	129.5	123.1	116.5	107.3	99.3
F-15 (P220)	90%	NC	117.3	112	106.1	97	88.4
F-16 (P229)	93%	NC	116.5	110.8	104.6	95	86.3
F-22	100%	ETR	124.2	118.7	112.7	103.5	95.2
Landing/Arrival Operations (at 160 knots airspeed)							
A-10A	5225	NF	97.9	91.5	83.3	67	55
B-1	90%	RPM	103.4	98.3	92.7	83.4	74.4
F-15 (P220)	75%	NC	94.2	89.2	83.6	74.9	66.9
F-16 (P229)	83.5%	NC	97.4	92.1	86.3	76.9	68.2
F-22	43%	ETR	114.9	109.3	103.1	93.5	84.5

Source: SELCalc2 (Flyover Noise Calculator), Using NoiseMap 6/7 and Maximum Omega10 Result as the defaults.
Notes:Engine Unit of Power: RPM—Revolutions Per Minute; ETR—Engine Thrust Ratio; NC—Engine Core RPM; and NF—Engine Fan RPM.

Because the SEL and the maximum sound level are both used to describe single events, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

SEL can be computed for C-weighted levels (appropriate for impulsive sounds), and the results denoted CSEL or L_{CE}. SEL for A-weighted sound is sometimes denoted ASEL. Within this study, SEL is used for A-weighted sounds and CSEL for C-weighted.

C1.2.4 Equivalent Sound Level

For longer periods of time, total sound is represented by the equivalent continuous sound pressure level (L_{eq}). L_{eq} is the average sound level over some time period (often an hour or a day, but any explicit time

span can be specified), with the averaging being done on the same energy basis as used for SEL. SEL and L_{eq} are closely related, with L_{eq} being SEL over some time period normalized by that time.
Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while Leq is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise.

C1.2.5 Day-Night Average Sound Level

Noise tends to be more intrusive at night than during the day. This effect is accounted for by applying a 10 dB penalty to events that occur after 10 pm and before 7 am. If L_{eq} is computed over a 24-hour period with this nighttime penalty applied, the result is the DNL. DNL is the community noise metric recommended by the USEPA (United States Environmental Protection Agency [USEPA] 1974) and has been adopted by most federal agencies (Federal Interagency Committee on Noise 1992). It has been well established that DNL correlates well with long-term community response to noise (Schultz 1978; Finegold *et al.* 1994). This correlation is presented in Section 1.3 of this appendix.

DNL accounts for the total, or cumulative, noise impact at a given location, and for this reason is often referred to as a “cumulative” metric.

It was noted earlier that, for impulsive sounds, such as sonic booms, C-weighting is more appropriate than A-weighting. The day-night average sound level computed with C-weighting is denoted CDNL or L_{Cdn}. This procedure has been standardized, and impact interpretive criteria similar to those for DNL have been developed (Committee on Hearing, Bioacoustics and Biomechanics 1981).

C1.2.6 Onset-Adjusted Monthly Day-Night Average Sound Level

Aircraft operations in military training airspace generate a noise environment somewhat different from other community noise environments. Overflights are sporadic, occurring at random times and varying from day to day and week to week. This situation differs from most community noise environments, in which noise tends to be continuous or patterned. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset.

To represent these differences, the conventional DNL metric is adjusted to account for the “surprise” effect of the sudden onset of aircraft noise events on humans (Plotkin *et al.* 1987; Stusnick *et al.* 1992; Stusnick *et al.* 1993). For aircraft exhibiting a rate of increase in sound level (called onset rate) of from 15 to 150 dB per second, an adjustment or penalty ranging from 0 to 11 dB is added to the normal SEL. Onset rates above 150 dB per second require an 11 dB penalty, while onset rates below 15 dB per second

require no adjustment. The DNL is then determined in the same manner as for conventional aircraft noise events and is designated as Onset-Rate Adjusted Day-Night Average Sound Level (abbreviated L_{dnmr}). Because of the irregular occurrences of aircraft operations, the number of average daily operations is determined by using the calendar month with the highest number of operations. The monthly average is denoted L_{dnmr}. Noise levels are calculated the same way for both DNL and L_{dnmr}. L_{dnmr} is interpreted by the same criteria as used for DNL.

1.3 Noise Impact

C1.3.1 Community Reaction

Studies of long-term community annoyance to numerous types of environmental noise show that DNL correlates well with the annoyance. Schultz (1978) showed a consistent relationship between DNL and annoyance. Shultz's original curve fit (Figure C-2) shows that there is a remarkable consistency in results of attitudinal surveys which relate the percentages of groups of people who express various degrees of annoyance when exposed to different DNL.

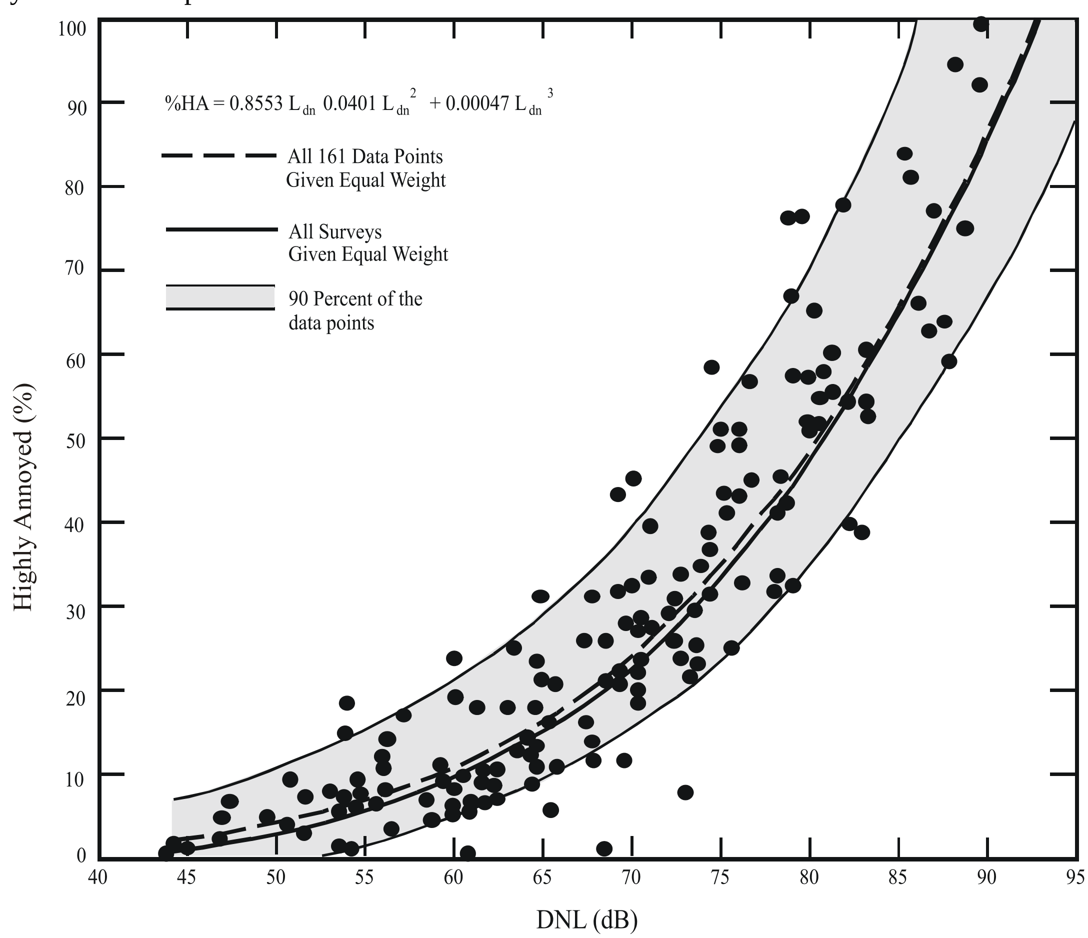
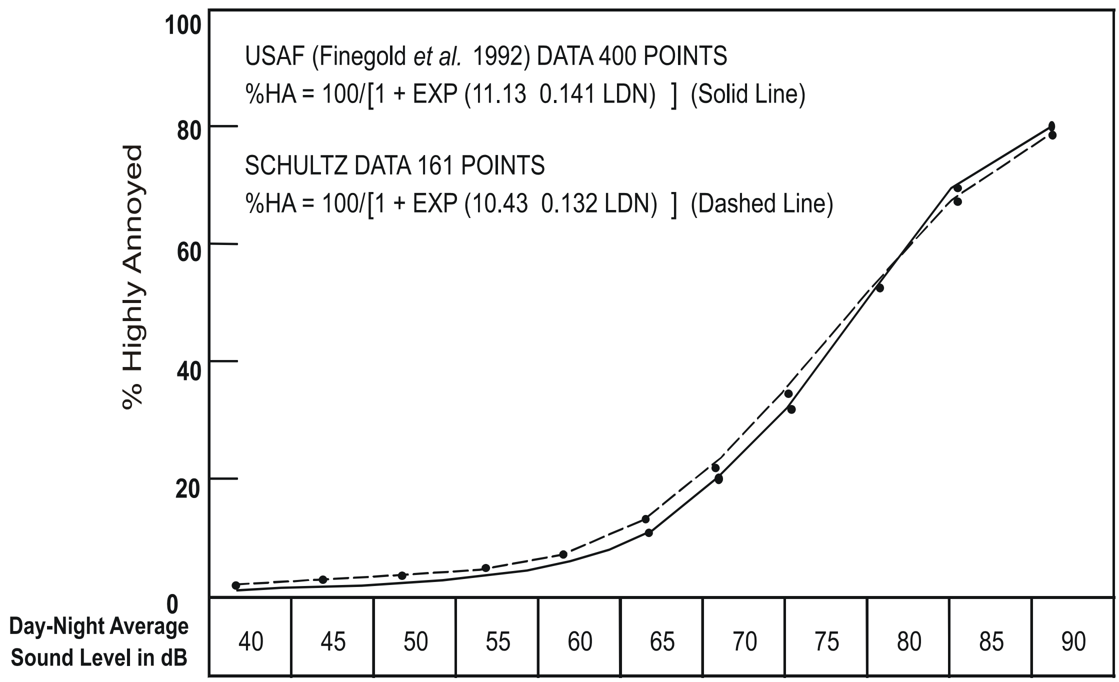


Figure C-2 Community Surveys of Noise Annoyance
Source: Schultz 1978

Another study has reaffirmed this relationship (Fidell *et al*. 1991). Figure C-3 (Federal Interagency Committee on Noise 1992) shows an updated form of the curve fit (Finegold *et al*. 1994) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.



Calculated %HA Points											
USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Figure C-3 Response of Communities to Noise; Comparison of Original (Schultz 1978) and Current (Finegold *et al*. 1994) Curve Fits

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. DNL accounts for the sound level of individual noise events, the duration of those events, and the number of events. Its use is endorsed by the scientific community (American National Standards Institute 1980, 1988, 2005; USEPA 1974; Federal Interagency Committee on Urban Noise 1980; Federal Interagency Committee on Noise 1992).

While DNL is the best metric for quantitatively assessing cumulative noise impact, it does not lend itself to intuitive interpretation by non-experts. Accordingly, it is common for environmental noise analyses to include other metrics for illustrative purposes. A general indication of the noise environment can be presented by noting the maximum sound levels which can occur and the number of times per day noise events will be loud enough to be heard. Use of other metrics as supplements to DNL has been endorsed by federal agencies (Federal Interagency Committee on Noise 1992).

The Schultz curve is generally applied to annual average DNL. In Section 1.2, L_{dnmr} was described and presented as being appropriate for quantifying noise in military airspace. The Schultz curve is used with L_{dnmr} as the noise metric. L_{dnmr} is always equal to or greater than DNL, so impact is generally higher than would have been predicted if the onset rate and busiest-month adjustments were not accounted for.

There are several points of interest in the noise-annoyance relation. The first is DNL of 65 dB. This is a level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like aviation which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. The second is DNL of 55 dB, which was identified by USEPA as a level "...requisite to protect the public health and welfare with an adequate margin of safety," (USEPA 1974) which is essentially a level below which adverse impact is not expected. The third is DNL of 75 dB. This is the lowest level at which adverse health effects could be credible (USEPA 1974). The very high annoyance levels correlated with DNL of 75 dB make such areas unsuitable for residential land use.

Sonic boom exposure is measured by C-weighting, with the corresponding cumulative metric being CDNL. Correlation between CDNL and annoyance has been established, based on community reaction to impulsive sounds (Committee on Hearing, Bioacoustics and Biomechanics 1981). Values of the C-weighted equivalent to the Schultz curve are different than that of the Schultz curve itself. Table C-3 shows the relation between annoyance, DNL, and CDNL.

Table C-3. Relation Between Annoyance, DNL and CDNL

DNL	*% Highly Annoyed*	*CDNL*
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

Interpretation of CDNL from impulsive noise is accomplished by using the CDNL versus annoyance values in Table C-3. CDNL can be interpreted in terms of an "equivalent annoyance" DNL. For

example, CDNL of 52, 61, and 69 dB are equivalent to DNL of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

C1.3.2 Land Use Compatibility

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating CDNL to an "equivalent annoyance" DNL, as outlined in Section 1.3.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise published guidelines (Federal Interagency Committee on Urban Noise 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, DoD and FAA adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. The FAA included the committee's guidelines in the Federal Aviation Regulations (United States Department of Transportation 1984). These guidelines are reprinted in Table C-4, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (note the footnote "*" in the table), they provide the best means for determining noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL values above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases a change in noise level, rather than an absolute threshold, may be a more appropriate measure of impact.

Table C-4. Land Use Compatibility, Noise Exposure, and Accident Potential								
Land Use		***Accident Potential Zones***			***Noise Zones***			
SLUCM No.	*Name*	*Clear Zone*	*APZ I*	*APZ II*	*65-69 dB*	*70-74 dB*	*75-79 dB*	*80+ dB*
10	Residential							
11	Household units							
11.11	Single units; detached	N	N	Y[1]	A[11]	B[11]	N	N
11.12	Single units; semidetached	N	N	N	A[11]	B[11]	N	N
11.13	Singe units; attached row	N	N	N	A[11]	B[11]	N	N
11.21	Two units; side-by-side	N	N	N	A[11]	B[11]	N	N
11.22	Two units; one above the other	N	N	N	A[11]	B[11]	N	N
11.31	Apartments; walk up	N	N	N	A[11]	B[11]	N	N
11.32	Apartments; elevator	N	N	N	A[11]	B[11]	N	N
12	Group quarters	N	N	N	A[11]	B[11]	N	N
13	Residential hotels	N	N	N	A[11]	B[11]	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A[11]	B[11]	C[11]	N
16	Other residential	N	N	N[1]	A[11]	B[11]	N	N
20	Manufacturing							
21	Food and kindred products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
22	Textile mill products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
24	Lumber and wood products (except furniture); manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
25	Furniture and fixtures; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
26	Paper and allied products; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
27	Printing, publishing, and allied industries	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
28	Chemicals and allied products; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
29	Petroleum refining and related industries	N	N	N	Y	Y[12]	Y[13]	Y[14]
30	Manufacturing							
31	Rubber and misc. plastic products, manufacturing	N	N[2]	N[2]	Y	Y[12]	Y[13]	Y[14]
32	Stone, clay and glass products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
33	Primary metal industries	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
34	Fabricated metal products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks; manufacturing	N	N	N[2]	Y	A	B	N
39	Miscellaneous manufacturing	N	Y[2]	Y[2]	Y	Y[12]	Y[13]	Y[14]
40	Transportation, communications, and utilities							
41	Railroad, rapid rail transit, and street railroad transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
42	Motor vehicle transportation	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
43	Aircraft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
44	Marine craft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
45	Highway and street right-of-way	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
46	Automobile parking	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
47	Communications	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
48	Utilities	N[3]	Y[4]	Y	Y	Y	Y[12]	Y[13]
49	Other transportation communications and utilities	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
50	Trade							
51	Wholesale trade	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
52	Retail trade-building materials, hardware and farm equipment	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
53	Retail trade-general merchandise	N[2]	N[2]	Y[2]	Y	A	B	N

Table C-4. Land Use Compatibility, Noise Exposure, and Accident Potential

Land Use		*Accident Potential Zones*			*Noise Zones*			
SLUCM No.	*Name*	*Clear Zone*	*APZ I*	*APZ II*	*65-69 dB*	*70-74 dB*	*75-79 dB*	*80+ dB*
54	Retail trade-food	N[2]	N[2]	Y[2]	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N[2]	N[2]	Y[2]	Y	A	B	N
56	Retail trade-apparel and accessories	N[2]	N[2]	Y[2]	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N[2]	N[2]	Y[2]	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N[2]	Y	A	B	N
59	Other retail trade	N	N[2]	Y[2]	Y	A	B	N
60	Services							
61	Finance, insurance, and real estate services	N	N	Y[6]	Y	A	B	N
62	Personal services	N	N	Y[6]	Y	A	B	N
62.4	Cemeteries	N	Y[7]	Y[7]	Y	Y[12]	Y[13]	Y[14,2,1]
63	Business services	N	Y[8]	Y[8]	Y	A	B	N
64	Repair services	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
65	Professional services	N	N	Y[6]	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y[6]	Y	Y	A	B	N
67	Governmental services	N[6]	N	Y[6]	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N[2]	Y[2]	Y	A	B	N
70	Cultural, entertainment and recreational							
71	Cultural activities (including churches)	N	N	N[2]	A*	B*	N	N
71.2	Nature exhibits	N	Y[2]	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N
72.11	Outdoor music shell, amphitheatres	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y[17]	Y[17]	N	N
73	Amusements	N	N	Y[8]	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N Y	Y[8,9,10]	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y[8]	Y[8]	Y*	Y*	N	N
79	Other cultural, entertainment, and recreation	N[9]	Y[9]	Y[9]	Y*	Y*	N	N
80	Resources production and extraction							
81	Agriculture (except livestock)	Y[16]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
82	Agricultural related activities	N	Y[5]	Y	Y[18]	Y[19]	N	N

Table C-4. Land Use Compatibility, Noise Exposure, and Accident Potential

Land Use		*Accident Potential Zones*			*Noise Zones*			
SLUCM No.	*Name*	*Clear Zone*	*APZ I*	*APZ II*	*65-69 dB*	*70-74 dB*	*75-79 dB*	*80+ dB*
80	Resources production and extraction							
83	Forestry activities and related services	N[5]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
84	Fishing activities and related services	N[5]	Y[5]	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y[5]	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y[5]	Y	Y	Y	Y	Y

Legend:
SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation
Y = Yes; land use and related structures are compatible without restriction.
N = No; land use and related structures are not compatible and should be prohibited.
A, B, or C = Land use and related structures generally compatible; measures to achieve Noise Level Reduction of A (25 db), B (30 db), or C (35 db) should be incorporated into the design and construction of structures.
A*, B*, or C* = Land use generally compatible with Noise Level Reduction. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes.
* = The designation of these uses as "compatible" in this zone reflects individual federal agency and program consideration of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.
Notes:
[1]Suggested maximum density of 1-2 dwelling units per acre possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.
[2]Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible in any APZ.
[3]The placing of structures, buildings, or above ground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See AFI 32-7063 and AFI 32-1026 for specific guidance.
[4]No passenger terminals and no major above ground transmission lines in APZ I.
[5]Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
[6]Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.
[7]Excludes chapels.
[8]Facilities must be low intensity.
[9]Clubhouse not recommended.
[10]Areas for gatherings of people are not recommended.
[11a]Although local conditions may require residential use, it is discouraged in DNL 65-69 dB and strongly discouraged in DNL 70-74 dB. An evaluation should be conducted prior to approvals, indicating that a demonstrated community need for residential use would not be met if development were prohibited in these zones, and that there are no viable alternative locations.
[11b]Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor NLR for DNL 65-69 dB and DNL 70-74 dB should be incorporated into building codes and considered in individual approvals.
[11c]NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.
[12]Measures to achieve the same NLR as required for facilities in the DNL 65-69 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
[13]Measures to achieve the same NLR as required for facilities in the DNL 70-74 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
[14]Measures to achieve the same NLR as required for facilities in the DNL 75-79 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
[15]If noise sensitive, use indicated NLR; if not, the use is compatible.
[16]No buildings.
[17]Land use is compatible provided special sound reinforcement systems are installed.
[18]Residential buildings require the same NLR required for facilities in the DNL 65-69 dB range.
[19]Residential buildings require the same NLR required for facilities in the DNL 70-74 dB range.
[20]Residential buildings are not permitted.
[21]Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

C2.0 NOISE EFFECTS

The discussion in Section C1.3 presents the global effect of noise on communities. The following sections describe particular noise effects.

C2.1 Nonauditory Health Effects

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have not been found to occur at levels below those protective against noise-induced hearing loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on January 22–24, 1990, in Washington, D.C., which states "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day)" (von Gierke 1990; parenthetical wording added for clarification). At the International Congress (1988) on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss; and even above these criteria, results regarding such health effects were ambiguous.

Consequently, it can be concluded that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place.

Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies which purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, in an often-quoted paper, two University of California at Los Angeles researchers found a relation between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meecham and Shaw 1979). Nevertheless, three other University of California at Los Angeles professors analyzed those same data and found no relation between noise exposure and mortality rates (Frerichs *et al*. 1980).

As a second example, two other University of California at Los Angeles researchers used this same population near Los Angeles International Airport to show a higher rate of birth defects during the period of 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the United States Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relation in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds 1979).

In a review of health effects, prepared by a Committee of the Health Council of The Netherlands (Committee of the Health Council of the Netherlands 1996), analyzed currently available published information on this topic. The committee concluded that the threshold for possible long-term health effects was a 16-hour (6:00 a.m. to 10:00 p.m.) L_{eq} of 70 dB. Projecting this to 24 hours and applying the 10 dB nighttime penalty used with DNL, this corresponds to DNL of about 75 dB. The study also affirmed the risk threshold for hearing loss, as discussed earlier.

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

C2.2 Annoyance

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the USEPA as any negative subjective reaction on the part of an individual or group (USEPA 1974). As noted in the discussion of DNL above, community annoyance is best measured by that metric.

Because the USEPA Levels Document (USEPA 1974) identified DNL of 55 dB as ". . . requisite to protect public health and welfare with an adequate margin of safety," it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial and technical resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (Federal Interagency Committee on Noise 1992). This corresponds to about 12 percent of the exposed population being highly annoyed.

Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often an acceptable compromise, it is not a statutory limit, and it is appropriate to consider other thresholds in particular cases.

In this analysis, no specific threshold is used. The noise in the affected environment is evaluated on the basis of the information presented in this appendix and in the body of the environmental analysis.

Community annoyance from sonic booms is based on CDNL, as discussed in Section 1.3. These effects are implicitly included in the "equivalent annoyance" CDNL values in Table C-3, since those were developed from actual community noise impact.

C2.3 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities in the home, such as radio or television listening, telephone use, or family conversation, gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that the use of the SEL metric will measure speech interference successfully, and that a SEL exceeding 65 dB will begin to interfere with speech communication.

Classroom Criteria

For listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., the difference between the speech level and the level of the interfering noise) is in the range 15 to 18 dB (Lazarus 1990). Both the American National Standard Institute (ANSI) and the American Speech-Language-Hearing Association (ASLHA) recommend at least a 15-dB signal-to-noise ratio in classrooms, to ensure that children with hearing impairments and language disabilities are able to enjoy high speech intelligibility (ANSI 2002, AHSLA 1995). As such, provided that the average adult male or female voice registers a minimum of 50 dB L_{max} in the rear of the classroom, the ANSI standard requires that the continuous background noise level indoors must not exceed a L_{eq} of 35 dB (assumed to apply for the duration of school hours). The World Health Organization (WHO) reported for a speaker-to-listener distance of about 1 meter, empirical observations have shown that speech in relaxed conversations is 100 percent intelligible in background noise levels of about 35 dB, and speech can be fairly well understood in the presence of background levels of 45 dB. The WHO recommends a guideline value of 35 dB L_{eq} for continuous background levels in classrooms during school hours (WHO 2000). Bradley suggests that in smaller rooms, where speech levels in the rear of the classroom are approximately 50 dB L_{max}, steady-state noise levels above 35 dB L_{eq} may interfere with the intelligibility of speech (Bradley 1993).

For the purposes of determining eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} resulting from aircraft operations during normal school hours (FAA 1985). However, most aircraft noise is not continuous and consists of individual events where the sound level exceeds the background level for a limited time period as the aircraft flies over. Since speech interference in the presence of aircraft noise is essentially determined by the magnitude and frequency of individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate when evaluating the overall

effects. In addition to the background level criteria described above, single-event criteria, which account for those sporadic intermittent outdoor noisy events, are also essential to specifying speech interference criteria.

In 1984, a report to the Port Authority of New York and New Jersey recommended utilizing the Speech Interference Level (SIL) metric for classroom noise criteria (Sharp and Plotkin 1984). This metric is based on the maximum sound levels in the frequency range (approximately 500 Hz to 2,000 Hz) that directly affects speech communication. The study identified an SIL (the average of the sound levels in the 500, 1000, and 2000 Hz octave-bands) of 45 dB as the desirable goal, which was estimated to provide 90 percent word intelligibility for the short time periods during aircraft over-flights. Although early classroom level criteria were defined in terms of SIL, the use and measurement of L_{max} as the primary metric has since become more popular. Both metrics take into consideration the L_{max} associated with intermittent noise events and can be related to existing background levels when determining speech interference percentages. An SIL of 45 dB is approximately equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

In 1998, a report also concluded that if an aircraft noise event's indoor L_{max} reached the speech level of 50 dB, 90 percent of the words would be understood by students seated throughout the classroom (Lind *et al.* 1998). Since intermittent aircraft noise does not appreciably disrupt classroom communication at lower levels and other times, the authors also adopted an indoor L_{max} of 50 dB as the maximum single-event level permissible in classrooms. Note that this limit was set based on students with normal hearing and no special needs; at-risk students may be adversely affected at lower sound levels.

Bradley recommends SEL as a better indicator of indoor estimated speech interference in the presence of aircraft overflights (Bradley 1985). For acceptable speech communication using normal vocal efforts, Bradley suggests that the indoor SEL be no greater than 64 dB. He assumes a 26 dB outdoor to indoor noise reduction that equates to 90 dB SEL outdoors. Aircraft events producing outdoor SEL values greater than 90 dB would result in disruption to indoor speech communication. Bradley's work indicates that, for speakers talking with a casual vocal effort, 95 percent intelligibility would be achieved when indoor SEL values did not exceed 60 dB, which translates approximately to an L_{max} of 50 dB.

In the presence of intermittent noise events, ANSI states that the criteria for allowable background noise level can be relaxed since speech is impaired only for the short time when the aircraft noise is close to its maximum value. Consequently, they recommend when the background noise level of the noisiest hour is dominated by aircraft noise, the indoor criteria (35 dB L_{eq} for continuous background noise) can be increased by 5 dB to an L_{eq} of 40 dB, as long as the noise level does not exceed 40 dB for more than 10 percent of the noisiest hour (ANSI 2002).

The WHO does not recommend a specific indoor L_{max} criterion for single-event noise, but does place a guideline value at L_{eq} of 35 dB for overall background noise in the classroom. However, WHO does report that "for communication distances beyond a few meters, speech interference starts at sound pressure levels below 50 dB for octave bands centered on the main speech frequencies at 500 Hz, 1 kHz, and 2 kHz" (WHO 2000). One can infer this can be approximated by an L_{max} value of 50 dB.

The United Kingdom Department for Education and Skills (UKDFES) established in its classroom acoustics guide a 30-minute time-averaged metric [L_{eq} (30min)] for background levels and LA1,30 min for intermittent noises, at thresholds of 30 to 35 dB and 55 dB, respectively. LA1,30 min represents the A-weighted sound level that is exceeded one percent of the time (in this case, during a 30 minute teaching session) and is generally equivalent to the L_{max} metric (UKDFES 2003).

In summary, as the previous section demonstrates, research indicates that it is not only important to consider the continuous background levels using time-averaged metrics, but also the intermittent events, using single-event metrics such as L_{max}. Table C-5 provides a summary of the noise level criteria recommended in the scientific literature.

Table C-5. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	*Metric/Level (dB)*	*Effects and Notes*
U.S. FAA (1985)	L_{eq}(during school hours) = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used
Lind *et al.* (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom
WHO (1999)	L_{eq} = 35 dB / Lmax = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB
U.S. ANSI (2002)	L_{eq} = 40 dB	Based on Room Volume Acceptable background level for continuous noise/ relaxed criteria for intermittent noise in the classroom
U.K. DFES (2003)	L_{eq} (30min) = 30-35 dB / L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs

When considering intermittent noise caused by aircraft overflights, a review of the relevant scientific literature and international guidelines indicates that an appropriate criteria is a limit on indoor background noise levels of 35 to 40 dB L_{eq} and a limit on single events of 50 dB L_{max}.

C2.4 Sleep Disturbance

Sleep interference is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of

lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons *et al*. 1989). The analysis concluded that a lack of reliable in-home studies, combined with large differences among the results from the various laboratory studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions. A recent extensive study of sleep interference in people's own homes (Ollerhead 1992) showed very little disturbance from aircraft noise.

There is some controversy associated with the recent studies, so a conservative approach should be taken in judging sleep interference. Based on older data, the USEPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (USEPA 1974). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

A 1984 publication reviewed the probability of arousal or behavioral awakening in terms of SEL (Kryter 1984). Figure C-4, extracted from Figure 10.37 of Kryter (1984), indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects. Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

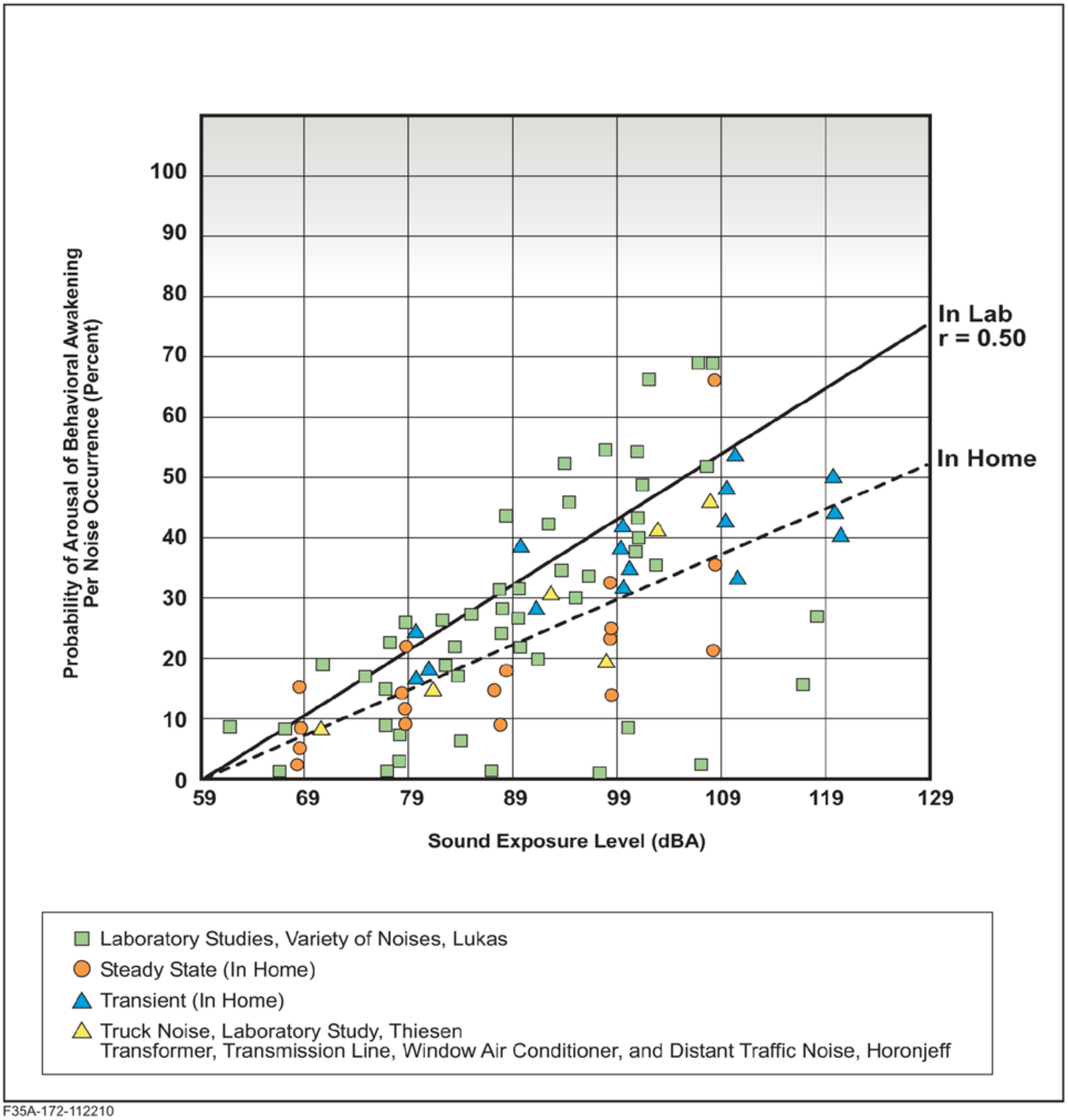


Figure C-4 Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level

C2.5 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound; i.e. a shift in the hearing threshold to a higher level. This change can either be a Temporary Threshold Shift (TTS), or a Permanent Threshold Shift (PTS) (Berger 1995). TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a Temporary Threshold Shift results in a Permanent Threshold Shift is difficult to identify and varies with a person's sensitivity.

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). The Occupational Safety and Health Administration (OSHA) regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (DoL 1971). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The USEPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (USEPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the WHO has concluded that environmental and leisure-time noise below an $L_{eq}24$ value of 70

dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

C2.5.1 Hearing Loss and Aircraft Noise

The 1982 USEPA Guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (USEPA 1982). This effect is also described as Potential Hearing Loss (PHL). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS, or Ave NIPTS for short. The Average Noise Induced Permanent Threshold Shift (Ave. NIPTS) that can be expected for noise exposure as measured by the DNL metric is given in Table C-6.

Table C-6. Average NIPTS and 10th Percentile NIPTS as a Function of DNL

DNL	*Ave. NIPTS dB**	*10th Percentile NIPTS dB**
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

Note: *Rounded to the nearest 0.5 dB.

For example, for a noise exposure of 80 dB DNL, the expected lifetime average value of NIPTS is 2.5 dB, or 6.0 dB for the 10th percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occurring between 10 p.m. and 7 a.m. If, however, flight operations between the hours of 10 p.m. and 7 a.m. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The USEPA criterion ($L_{eq}24$ = 70 dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the U.S., Japan, and the U.K. have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB and higher (DoD 2009). Specifically, DoD components are directed to "*use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss*". This does not preclude populations outside the 80 DNL contour, i.e. at lower exposure levels, from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on MTRs (Nixon *et al.* 1993). The potential effects of aircraft flying along MTRs is of particular concern because of maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts showed an increase in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight noise (Ising *et al.* 1999). According to the authors, the results indicate that repeated exposure to military low-altitude flight noise

with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

C2.5.2 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Cantrell 1974). Cantrell concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." Psychological stresses may cause a physiological stress reaction that could result in impaired health. The National Institute for Occupational Safety and Health (NIOSH) and USEPA commissioned CHABA in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

> Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been further studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older

subjects and those not reporting impaired hearing ability (Rosenlund *et al*. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak *et al*. 1990).

Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles *et al*. 1990). The U.S. Department of the Navy prepared a programmatic Environmental Assessment (EA) for the continued use of non-explosive ordnance on the Vieques Inner Range. Following the preparation of the EA, it was learned that research conducted by the University of Puerto Rico, Ponce School of Medicine, suggested that Vieques fishermen and their families were experiencing symptoms associated with vibroacoustic disease (VAD) (DoN 2002). The study alleged that exposure to noise and sound waves of large pressure amplitudes within lower frequency bands, associated with Navy training activities—specifically, air-to-ground bombing or naval fire support—was related to a larger prevalence of heart anomalies within the Vieques fishermen and their families. The Ponce School of Medicine study compared the Vieques group with a group from Ponce Playa. A 1999 study conducted on Portuguese aircraft-manufacturing workers from a single factory reported effects of jet aircraft noise exposure that involved a wide range of symptoms and disorders, including the cardiac issues on which the Ponce School of Medicine study focused. The 1999 study identified these effects as VAD.

Johns Hopkins University (JHU) conducted an independent review of the Ponce School of Medicine study, as well as the Portuguese aircraft workers study and other relevant scientific literature. Their findings concluded that VAD should not be accepted as a syndrome, given that exhaustive research across a number of populations has not yet been conducted. JHU also pointed out that the evidence supporting the existence of VAD comes largely from one group of investigators and that similar results would have to be replicated by other investigators. In short, JHU concluded that it had not been established that noise was the causal agent for the symptoms reported and no inference can be made as to the role of noise from naval gunfire in producing echocardiographic abnormalities (DoN 2002).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day).

At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two UCLA researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs *et al*. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds *et al*. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time average sound levels below 75 dB. The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increases in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus (Harris 1997).

C2.5.3 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task. While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

C2.5.4 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

C2.5.5 Effects on Learning and Cognitive Abilities

In 2002 ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the 1-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In

schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in the last 20 years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning. Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green *et al*. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993, Hygge 1994, and Evans *et al*. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997, Cohen *et al*. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines *et al*. 2001a,b). Similarly, a 1994 study found that students exposed to aircraft noise

of approximately 76 dBA scored 20 percent lower on recall ability tests than students exposed to ambient noise of 42-44 dBA (Hygge 1994). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans *et al*. 1998, Haines *et al*. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines *et al.* 2001a,b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests were equal to that of the control group once the airport was closed. (Hygge *et al*. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (WHO 2000, NATO 2000).

C2.5.6 Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans *et al*. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen *et al*. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines *et al*. 2001b,c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen *et al*. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977, Andrus *et al*. 1975, Wu *et al*. 1995).

C2.6 Noise Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci *et al.* assert that the consequences that physiological effects may have on behavioral patterns are vital to understanding the long-term effects of noise on wildlife (1988). Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed outlines those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.
A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and the introduction of supersonic jet aircraft. According to Manci et al., the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes (1988).

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and others that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or interfere with behavioral patterns (Manci et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate and attract other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects. These include population decline and habitat loss. Most of the effects of noise are mild enough to be undetectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci et al. literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been previous exposures. Responses range from flight, trampling, stampeding, jumping, or running to movement of the head in the apparent direction of the noise source. Manci et al. reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals (1988).

C2.6.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights, but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci *et al*. 1988). Some studies have reported primary and secondary effects including reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies and claims by farmers linking adverse effects of aircraft noise on livestock did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry), and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies, but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (U.S. Air Force 1994b). A similar study reported that abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (U.S. Air Force 1994b). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994b).

A majority of the studies reviewed suggest that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects on domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it

was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

One study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period, and none were associated with aircraft disturbances (U.S. Air Force 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level at 400 knots by running less than 10 meters. They resumed normal activity within one minute (U.S. Air Force 1994b). In 1983, Beyer found that helicopters caused more reaction than other low-aircraft overflights. A 1964 study also found that helicopters flying 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers (U.S. Air Force 1994b).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or have their pregnancies disrupted after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (U.S. Air Force 1994b). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994b).
In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). In 1995, Bowles cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994b). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc *et al*. studied the effects of F-14 jet aircraft noise on pregnant mares (1991). They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours or 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond *et al*. demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to aircraft noise (1963). Observations of heart rate increase were recorded and it was noted that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise. Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, and reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Manci *et al*. 1988; Gladwin *et al*. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 feet) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994a). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds and birds not previously exposed are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994a). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994a). This

suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (U.S. Air Force 1994a). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55 percent for panic reactions, 31 percent for decreased production, 6 percent for reduced hatchability, 6 percent for weight loss, and less than 1 percent for reduced fertility (U.S. Air Force 1994a).

Turkeys

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles *et al*. 1990a). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.
Low-altitude overflights were shown to cause turkey flocks which were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994a).

C2.6.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci *et al*. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci *et al*. 1988).

C2.6.3 Mammals

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals' ears, and levels of 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet above ground level over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger *et al*. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure and exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and for overflights higher than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kilogram animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters suggested that wolves were less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. These reactions occur naturally as a response to predation, so infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, are not additive. Aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci *et al*. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci *et al*. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaskan Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife, and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America 1980). Since 1980, it appears that research on the responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci *et al*. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms at 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci *et al*. 1988).
Jehl and Cooper indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds (1980). According to the research, although the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats because aircraft noise over water is mobile and would not persist over any particular area.

Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley Air Force Bases (AFBs) from sorties predominantly involving jet aircraft. Survey results reported in Davis *et al*. indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace (2000). The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Parks Service on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights (1994). Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. They also did not show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson *et al*. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats (although their hearing is actually similar to that of pinnipeds) (Bullock, *et al*. 1980). Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson *et al*. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Manatees spend most of their time below the surface and do not startle readily, so no effect of aircraft overflights on manatees would be expected (Bowles *et al*. 1991b).

C2.6.4 Birds

Auditory research conducted on birds indicates that they fall between reptiles and mammals relative to hearing sensitivity. According to Dooling, within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals (1978). In contrast to mammals, bird sensitivity falls off at a greater rate with increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis *et al*. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young

because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis *et al*. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant to 85 dB for crested tern (Ward and Stehn 1990; Brown 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by "raucous discordant cries." There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci *et al*. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci *et al*. reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights (1988). However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

Another study, conducted cooperatively between the DoD and the U.S. Fish and Wildlife Service (USFWS), assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater *et al*. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level, which ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater *et al*. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey in Alabama (1978). Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained

alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

B2.6.5 Raptors

In a literature review of raptor responses to aircraft noise, Manci *et al*. found that most raptors did not show a negative response to overflights (1988). When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis *et al*. performed a study to estimate the effects of low-level military jet aircraft and mid-to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle) (1991). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Re-occupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 meters or less produced few significant responses and no severe responses. Typical responses included crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or re-occupancy. The locations of some of the nests may have caused some birds to be habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci *et al*. noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises (1988). The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated that the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle

A study by Grubb and King on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances (1991). The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis *et al*. showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level (1991). Fleischner and Weisberg stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less (1986). They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane. The USFWS advised Cannon AFB that flights at or below 2,000 feet above ground level from October 1 through March 1 could result in adverse impacts to wintering bald eagles (USFWS 1998). However, Fraser *et al*. suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less (1985).

Osprey

A 1998 study by Trimper *et al*. in Goose Bay, Labrador, Canada focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-Tailed Hawk

Anderson *et al*. conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests (1989). Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (nine of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

C2.6.6 Migratory Waterfowl

A study of caged American black ducks was conducted by Fleming *et al*. in 1996. It was determined that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects.

Another study by Conomy *et al*. exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA (1998). It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaskan Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65 percent of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward *et al*. 1986). The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days (1974). Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of pre-migratory staging areas.

Manci *et al*. reported that waterfowl were particularly disturbed by aircraft noise (1988). The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards *et al*. 1979).

C2.6.7 Wading and Shore Birds

Black *et al*. studied the effects of low-altitude (less than 500 feet above ground level) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron) (1984). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75 percent of the 220 observations. Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at

their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach) (1986). Burger studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport (1981). Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when a Concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of Sooty Terns on the Dry Tortugas (Austin *et al*. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, Sooties were observed to react to sonic booms by rising in a "panic flight," circling over the island, and then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of Noddies on the same island hatched successfully in 1969, the year of the Sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles *et al.* 1991a; Bowles *et al*. 1994; Cottereau 1972; Cogger and Zegarra 1980) failed to show adverse effects on the hatching of eggs. A structural analysis (Ting *et al*. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport (1981). The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

C2.6.8 Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin *et al*. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus Scaphiopus), may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour in 1980 and Manci *et al*. in 1988, summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American Alligator and the Spectacled Caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including DNLs of 85 dB.

C2.6.9 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.
The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood. Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance one study suggests that wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the "startle" or "fright" response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife

species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

C2.7 Noise Effects on Property Values

Property within a noise zone (or Accident Potential Zone) may be affected by the availability of federally guaranteed loans. According to U.S. Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), and Veterans Administration (VA) guidance, sites are acceptable for program assistance, subsidy, or insurance for housing in noise zones of less than 65 dB DNL, and sites are conditionally acceptable with special approvals and noise attenuation in noise zones greater than 65 dB DNL. HUD's position is that noise is not the only determining factor for site acceptability, and properties should not be rejected only because of airport influences if there is evidence of acceptability within the market and if use of the dwelling is expected to continue. Similar to the Navy's and Air Force's Air Installation Compatible Use Zone Program, HUD, FHA, and VA recommend sound attenuation for housing in the higher noise zones and written disclosures to all prospective buyers or lessees of property within a noise zone (or Accident Potential Zone).

Newman and Beattie reviewed the literature to assess the effect of aircraft noise on property values (1985). One paper by Nelson, reviewed by Newman and Beattie, suggested a 1.8 to 2.3 percent decrease in property value per dB at three separate airports, while at another period of time, they found only a 0.8 percent devaluation per dB change in DNL (1978). However, Nelson also noted a decline in noise depreciation over time which was theorized to be due to either noise sensitive people being replaced by less sensitive people or the increase in commercial value of the property near airports; both ideas were supported by Crowley (1978). Ultimately, Newman and Beattie summarized that while an effect of noise was observed, noise is only one of the many factors that is part of a decision to move close to, or away from, an airport, but which is sometimes considered an advantage due to increased opportunities for employment or ready access to the airport itself. With all the issues associated with determining property

values, their reviews found that decreases in property values usually range from 0.5 to 2 percent per dB increase of cumulative noise exposure.

More recently, Fidell *et al*. studied the influences of aircraft noise on actual sale prices of residential properties in the vicinity of two military facilities, and found that equations developed for one area to predict residential sale prices in areas unaffected by aircraft noise worked equally well when applied to predicting sale prices of homes in areas with aircraft noise in excess of 65 dB DNL (1996). Thus, the model worked equally well in predicting sale prices in areas with and without aircraft noise exposure. This indicates that aircraft noise had no meaningful effect on residential property values. In some cases, the average sale prices of noise exposed properties were somewhat higher than those elsewhere in the same area. In the vicinity of Davis-Monthan AFB in Tucson, Arizona, Fidell found the homes near the AFB were much older, smaller, and in poorer condition than homes elsewhere. These factors caused the equations developed for predicting sale prices in areas further away from the base to be inapplicable with those nearer the AFB. However, similar to other researchers, Fidell found that differences in sale prices between homes with and without aircraft noise were frequently due to factors other than noise itself

C2.8 Noise Effects on Structures

C2.8.1 Subsonic Aircraft Noise

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component resonance. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (National Research Council/National Academy of Sciences 1977).

A study directed specifically at low-altitude, high-speed aircraft showed that there is little probability of structural damage from such operations (Sutherland 1989). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or “rattle,” of objects within the dwelling, such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

C2.8.2 Sonic Booms

Sonic booms are commonly associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table C-7 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is between one in a hundred and one in a thousand. Laboratory tests of glass (White 1972) have shown that properly installed window glass will not break at overpressures below 10 psf, even when subjected to repeated booms, but in the real world glass is not in pristine condition.

Table C-7. Possible Damage to Structures From Sonic Booms

Sonic Boom Overpressure Nominal (psf)	*Type of Damage*	*Item Affected*
0.5 - 2	Plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Glass	Rarely shattered; either partial or extension of existing.
	Roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	Failures show that would have been difficult to forecast in terms of their existing localized condition. Nominally in good condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Inside ("party") walls known to move at 10 psf.
Greater than 10	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.

Table C-7. Possible Damage to Structures From Sonic Booms		
Sonic Boom Overpressure Nominal (psf)	***Type of Damage***	***Item Affected***
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing, or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors.

Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted above. In general, structural damage from sonic booms should be expected only for overpressures above 10 psf.

C2.9 Noise Effects on Terrain

C2.9.1 Subsonic Aircraft Noise

Members of the public often believe that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects will result from routine, subsonic aircraft operations.

C2.9.2 Sonic Booms

In contrast to subsonic noise, sonic booms are considered to be a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow, and do occur spontaneously. They can be triggered by minor disturbances, and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season.
Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

2.10 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Again, there are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself.

As noted above for the noise effects of noise-induced vibrations on normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

C3.0 NOISE MODELING

C3.1 Subsonic Aircraft Noise

An aircraft in subsonic flight generally emits noise from two sources: the engines and flow noise around the airframe. Noise generation mechanisms are complex and, in practical models, the noise sources must be based on measured data. The Air Force has developed a series of computer models and aircraft noise databases for this purpose. The models include NOISEMAP (Moulton 1992) for noise around airbases, and MR_NMAP (Lucas and Calamia 1996) for use in MOAs, ranges, and low-level training routes. These models use the NOISEFILE database developed by the Air Force. NOISEFILE data includes SEL and L_{Amax} as a function of speed and power setting for aircraft in straight flight.

Noise from an individual aircraft is a time-varying continuous sound. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, then diminishes as it departs. The noise depends on the speed and power setting of the aircraft and its trajectory. The models noted above divide the trajectory into segments whose noise can be computed from the data in NOISEFILE. The contributions from these segments are summed.

MR_NMAP was used to compute noise levels in the airspace. The primary noise metric computed by MR_NMAP was L_{dnmr} averaged over each airspace. Supporting routines from NOISEMAP were used to calculate SEL and L_{Amax} for various flight altitudes and lateral offsets from a ground receiver position.

C3.2 Sonic Booms

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, this pair of shock waves and the expanding flow between them have the appearance of a capital letter “N,” so a sonic boom pressure wave is usually called an “N-wave.” An N-wave has a characteristic "bang-bang" sound that can be startling. Figure C-5 shows the generation and evolution of a sonic boom N-wave under the aircraft. Figure C-6 shows the sonic boom pattern for an aircraft in steady supersonic flight. The boom forms a cone that is said to sweep out a “carpet” under the flight track.

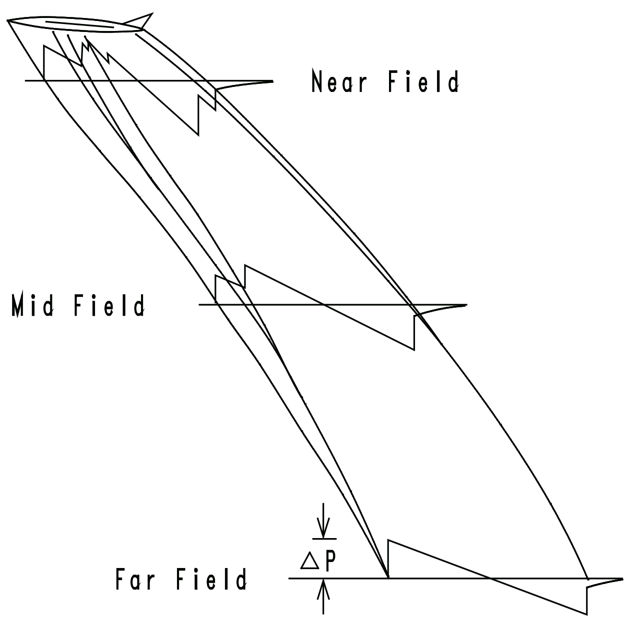


Figure C-5 Sonic Boom Generation and Evolution to N-Wave

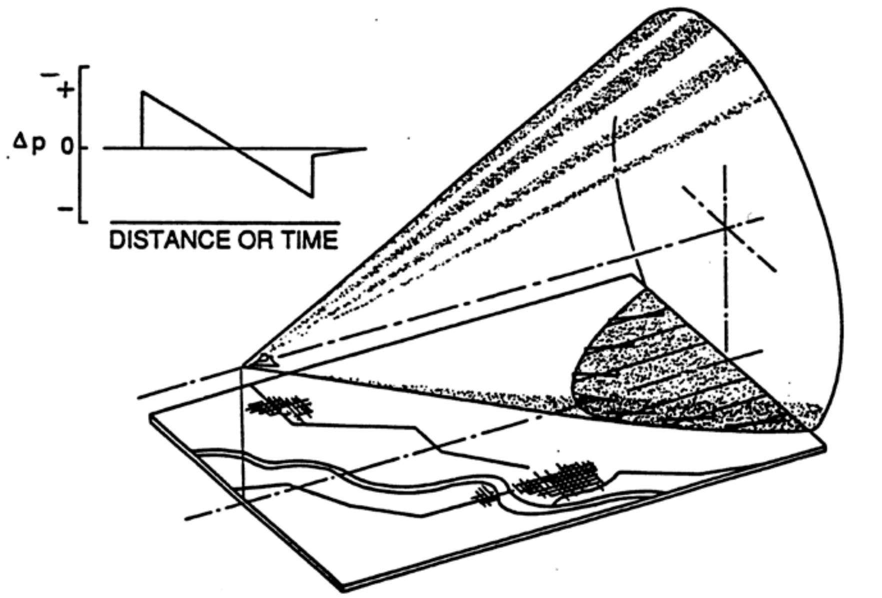


Figure C-6 Sonic Boom Carpet in Steady Flight

The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude. Figure C-7 illustrates the complexity of a nominal full mission.

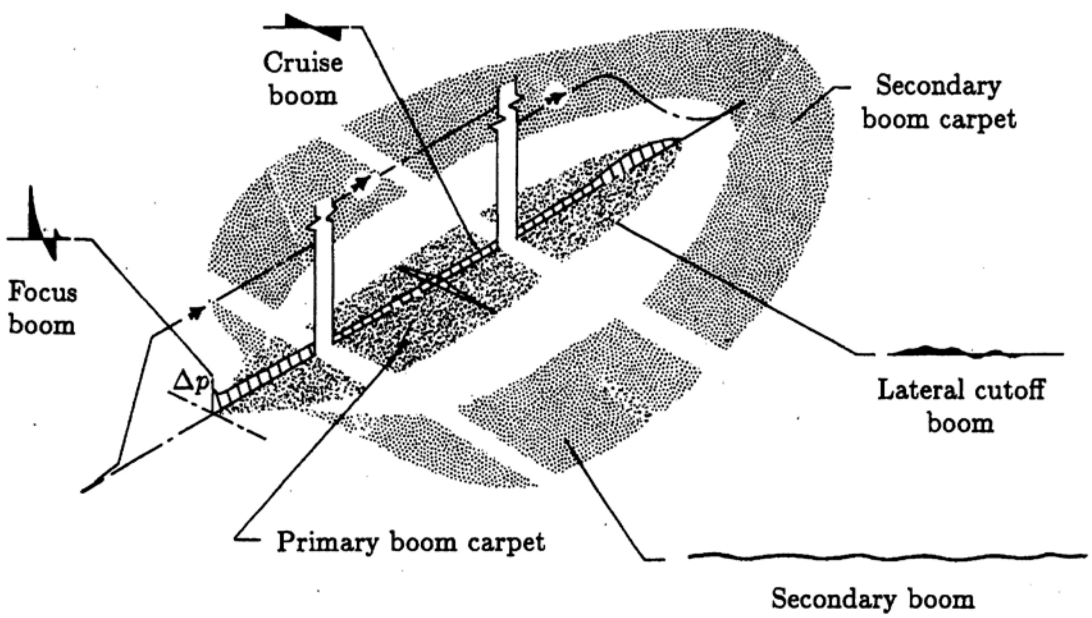


Figure C-7 Complex Sonic Boom Pattern for Full Mission

The Air Force's PCBoom4 computer program (Plotkin and Grandi 2002) can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver.

Supersonic operations for the proposed action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and maneuver for advantage during the engagement. Long time cumulative sonic boom exposure, CDNL, is meaningful for this kind of environment.

Long-term sonic boom measurement projects have been conducted in four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors.

Figure C-8 shows a sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin *et al.* 1989). The tracks fall into an elliptical pattern aligned with preferred engagement directions in the airspace. Figure C-9 shows the CDNL contours that were fit to six months of measured booms in that airspace. The subsequent measurement programs refined the fit, and demonstrated that the elliptical maneuver area is related to the size and shape of the airspace (Frampton *et al*. 1993). BOOMAP quantifies the size and shape of CDNL contours, and also numbers of booms per day, in air combat training airspaces. That model was used for prediction of cumulative sonic boom exposure in this analysis.

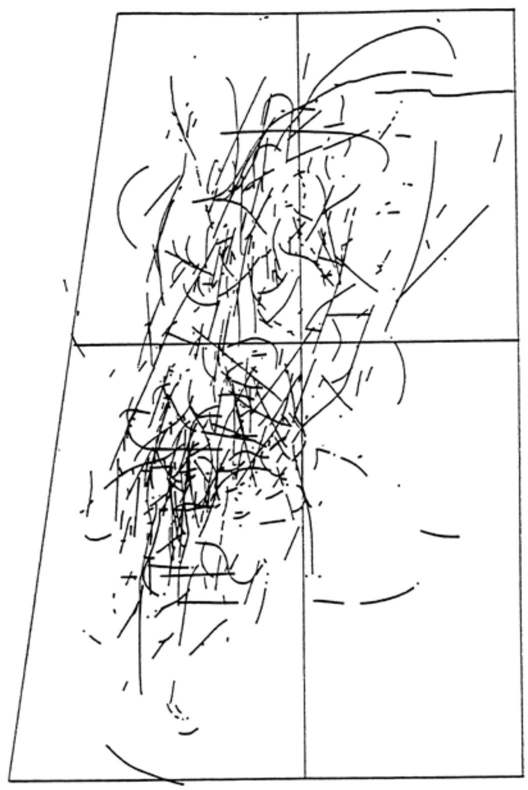


Figure C-8 Supersonic Flight Tracks in Supersonic Air Combat Training Airspace

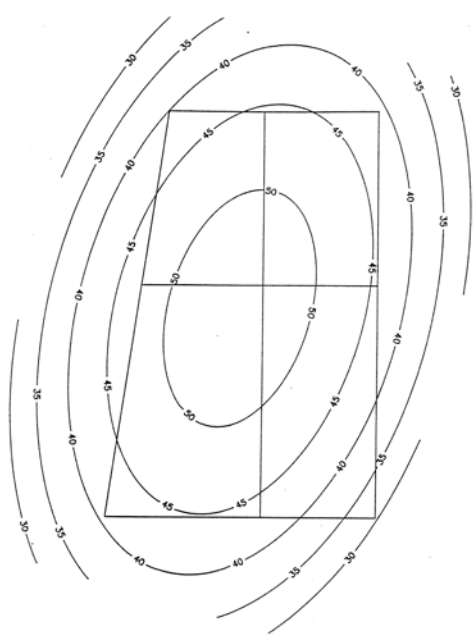


Figure C-9 Elliptical CDNL Contours in Supersonic Air Combat Training Airspace

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APPENDIX D
AIR QUALITY ANALYSIS

APPENDIX D
AIR QUALITY ANALYSIS

As described in section 3.4, air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. These standards (Table D-1) represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The Nevada Division of Environmental Protection, Bureau of Air Quality has adopted the NAAQS, with the following exceptions: 1) added 3-hour sulfur dioxide as a primary standard (this is a secondary standard under the NAAQS), 2) added standards for visibility impairment and 3) included a 1-hour hydrogen sulfide (H_2S) concentration standard. The state ambient air quality standards are also summarized in Table D-1.

Table D-1. National Ambient Air Quality Standards*			
	AVERAGING TIME	***PRIMARY***	***SECONDARY***
Ozone (O_3)[a]	8 Hours	0.075 ppm[a]	Same as Primary
	8 Hours	0.08 ppm[b]	Same as Primary
	1 Hour	0.12 ppm[c]	
Carbon Monoxide (CO)	8 Hours	9 ppm	None
	1 Hour	35 ppm	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	53 ppb[d]	Same as Primary
	1 Hour	100 ppb[e]	None
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	0.03 ppm	3 hour/0.5 ppm
	24 Hours	0.14 ppm	
	1 Hour	75 ppb[f]	None
Particulate Matter (PM_{10})[g]	24 Hours	150 μg/m³	Same as Primary
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean[h]	15 μg/m³	Same as Primary
	24 Hours[i]	35 μg/m³	---
Lead (Pb)	Quarterly Arithmetic Mean	1.5 μg/m³	Same as Primary

Source: USEPA 2010.

Notes: *ppm = parts per million by volume, μg/m³ = micrograms per cubic meter.

[a]To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008).

[b]To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. USEPA is in the process of reconsidering these standards (set in March 2008).

[c]USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.

[d]The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[e]To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

[f]Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

[g]Not to be exceeded more than once per year on average over 3 years.

[h]To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m3.

[i]To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m3 (effective December 17, 2006).

The air quality analysis in this EIS examined impacts from air emissions associated with the proposed action. As part of the analysis, emissions generated from construction/demolition, aircraft operation, aerospace ground equipment (AGE), motor vehicles, and other area (nonmobile) sources were examined for carbon monoxide (CO), nitrogen oxides (NO_X), sulfur dioxide (SO_X), ozone (in the form of volatile organic compounds VOCs), and particulate matter (PM_{10} and $PM_{2.5}$). Nellis AFB is located within the Las Vegas Valley of Clark County which is currently in nonattainment for three criteria pollutants: CO, PM_{10}, and 8-hour ozone (the 1997 standard). More detailed discussion of attainment status are presented below in Section 3.4.1. Because the affected environment falls within areas of nonattainment, the analysis must include a review of criteria pollutant emissions to assess whether a conformity determination is needed. Airborne criteria pollutant emissions of lead (Pb) are not included in this evaluation because there are no known significant lead emissions sources in the region or associated with the proposed action.

Construction Emissions

Construction activities would generate both combustive emissions from heavy equipment use and fugitive dust from ground-disturbing activities. Fugitive dust would be generated during construction activities associated with building construction, demolition, and modification. These emissions would be greatest during site clearing and grading activities. Emission rates for fugitive dust were estimated using guidelines outlined in the Western Regional Air Partnership (WRAP) fugitive dust handbook (WRAP 2004). These guidelines were developed for use in western states and they assume standard dust mitigation best practices activities. After PM_{10} is estimated, the fraction of fugitive dust emitted as $PM_{2.5}$ is calculated based on the most recent WRAP study (MRI 2005) that recommends the use of a fractional factor of 0.10.

Construction for the proposed action would disturb approximately 36 acres between 2011 and 2016. Factors needed to derive the construction source emission rates were obtained from *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling* (USEPA 2004a); *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition* (USEPA 2004b); *Nonroad Engine and Vehicle Emission Study—Report* (USEPA 1991); *Conversion Factors for Hydrocarbon Emission Components* (USEPA 2005); *Comparison of Asphalt Paving Emission Factors* (CARB 2005); *WRAP Fugitive Dust Handbook* (WRAP 2006); *Analysis of the Fine Fraction of Particulate Matter* (MRI 2005); and *Mobile 6.2.*

The analysis assumed that all construction equipment was manufactured before 2000. This approach provides a conservative value for emissions from proposed construction equipment, as the future equipment fleet would include a substantial amount of newer, lower-emitting equipment compared to pre-2000 equipment. The analysis also inherently reduced PM_{10} fugitive dust emissions from earth-moving activities by 50 percent as this control level is included in the emission factor itself. Diesel exhaust is a primary, well-documented source of $PM_{2.5}$ emissions. However, ratios of PM_{10} to $PM_{2.5}$ in diesel exhaust are not yet published and therefore, for the purposes of this EIS, all PM emissions are equally distributed as PM_{10} and $PM_{2.5}$.

Mobile source emissions were calculated for construction workers for each of the construction years using MOBILE6 modeling. This analysis assumed that no new construction jobs would be created under the proposed action, so no new commuting emissions to and from the base would be incurred within the regional area. This assumption is justified because of the rapid growth occurring in the Las Vegas Valley and the amount of construction to support this growth. These workers would be traveling somewhere in the Las Vegas Valley for their jobs so going to Nellis AFB would not introduce new emissions; therefore, the average mileage that was assumed for each worker was 4 miles. This amount accounts for on-base trips and driving during breaks. It was assumed that the speed of the vehicle would not exceed an average of 30 miles per hour.

Mobile emissions from commuting Air Force personnel were also calculated for those years (using the MOBILE6 model) in which the additional personnel would come to the base (2013, 2018, and 2024) and assumed that only 87 percent of these additional personnel would commute to and from the base. This assumption is supported by the Bureau of Transportation Statistics (BTS 2001) which indicate that 87 percent of the U.S. population drives their car to and from work and by examination of Nellis AFB existing commuting personnel numbers. These calculations also assumed a round trip distance of 20 miles per day, at a rate not exceeding an average of 30 miles per hour (South Nevada Regional Transportation Commission 2007).

Airfield and Airspace Operations

Emissions for the F-35 aircraft engine (F-135) were calculated using data provided by the Joint Strike Force Program Office in charge of design and development of the F-35 aircraft. Karnes2 modeling parameters were applied for flight profiles and time in mode (e.g., minutes at taxi/idle, takeoff, departure, and approach). The aerospace ground equipment (AGE) emissions used the fighter aircraft AGE default equipment found in the Air Conformity Applicability Model (ACAM) 4.3 as a surrogate since this equipment is still in the research stage. Because the proposed action is scheduled to take place over several years, emissions were calculated for the years in which the F-35 would be phased into the Nellis AFB inventory and overlap with construction activities.

This analysis used the best available data; however, when new operational aircraft and engine data are available the Air Force will re-evaluate emissions and determine whether substantial changes in this EIS's conclusions would be required. If that is the case, this information will be supplemented to this EIS and disseminated to the public.

Emission calculations within NTTR airspace used the number of F-35 projected operations below 7,000 feet AGL (refer to Table 4.4-4), calculated the percent contribution of these added aircraft to the regional emissions, and compared these emissions to the baseline number.

For both Nellis AFB and NTTR, the upper limits of the mixing height varies from region to region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable. Studies using National Weather Service stations throughout the U.S. (Holzworth 1972) provide a measure of the meteorological conditions to define mixing heights. For the areas encompassing Nellis AFB and NTTR, mixing heights average about 1,100 feet AGL in the morning and 8,000 feet AGL in the afternoon. Based on this pattern and coordination with the Clark County DAQEM, the average mixing height for the base and airspace is considered to be 7,000 feet AGL for this analysis. For the base airfield environment all 17,280 airfield operations were assumed to occur below 7,000 feel AGL and in NTTR airspace, 15,552 F-35 sortie-operations would

occur below 7,000 feet. Refer to the following pages to obtain specific data about aircraft power settings and assumptions, operational and construction emissions, as well as references.

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Staff Commuting Emissions - Calculated Using Mobile6

2012
F-35 Staff Commute

# vehicles**	mi/day***	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
193	20	250	0.0020227	0.0256063	0.0016325	1.8078E-05	5.5776E-05	0.9713	1,953	24,728	1,577	17	54	937,984
								Tons Per Year	**0.98**	**12.36**	**0.79**	**0.01**	**0.03**	**468.99**

2013
F-35 Staff Commute

# vehicles**	mi/day***	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
193	20	250	0.0015041	0.021412	0.0011304	1.8078E-05	5.47852E-05	0.93291474	1,452	20,678	1,092	17	53	900,916
								Tons Per Year	**0.73**	**10.34**	**0.55**	**0.01**	**0.03**	**450.46**

2014
F-35 Staff Commute

# vehicles**	mi/day***	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0014021	0.0206294	0.0010351	1.8078E-05	5.48942E-05	0.93366256	2,421	35,626	1,787	31	95	1,612,389
								Tons Per Year	**1.21**	**17.81**	**0.89**	**0.02**	**0.05**	**806.19**

2015
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0013184	0.019996	0.0009546	1.8078E-05	5.46737E-05	0.93366256	2,274	34,493	1,647	31	94	1,610,568
								Tons Per Year	**1.14**	**17.25**	**0.82**	**0.02**	**0.05**	**805.28**

2016
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0012456	0.0194224	0.0009546	1.8078E-05	5.46737E-05	0.93388302	2,149	33,504	1,647	31	94	1,610,948
								Tons Per Year	**1.07**	**16.75**	**0.82**	**0.02**	**0.05**	**805.47**

2017
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0011872	0.018971	0.0008256	1.8078E-05	5.46749E-05	0.93388302	2,048	32,725	1,424	31	94	1,610,948
								Tons Per Year	**1.02**	**16.36**	**0.71**	**0.02**	**0.05**	**805.47**

2018
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0011343	0.018541	0.0007771	1.8078E-05	5.46749E-05	0.93388302	1,957	31,983	1,341	31	94	1,610,948
								Tons Per Year	**0.98**	**15.99**	**0.67**	**0.02**	**0.05**	**805.47**

2019
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
345	20	250	0.0009392	0.0182319	0.0010935	1.8078E-05	5.50044E-05	0.93388302	1,620	31,450	1,886	31	95	1,610,948
								Tons Per Year	**0.81**	**15.73**	**0.94**	**0.02**	**0.05**	**805.47**

2020
F-35 Staff Commute

# vehicles	mi/day	days/yr	VOCs lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM10 lb/mi	CO2 lb/mi	VOCs lb/yr	CO lb/yr	NOx lb/yr	SOx lb/yr	PM10 lb/yr	CO2 lb/yr
358	20	250	0.0008984	0.0180335	0.0007176	1.8078E-05	5.48942E-05	0.93289094	1,610	32,320	1,286	32	98	1,671,927
								Tons Per Year	**0.81**	**16.16**	**0.64**	**0.02**	**0.05**	**835.96**

**Based on current proportion (87%) of personnel in private vehicles exiting/entering all gates at Nellis AFB (Comprehensive Traffic Study 2006).

***Southern Nevada Regional Transportation Commission, email correspondence October 2007. Average roundtrip daily commute for income levels greater than $50,000.

F-35 Beddown Construction Air Emissions

Construction Emissions

Emission Factors derived fromTables 1 and 7 in Exhaust and Crankcase Emission Factors for Compression Ignition Engines, USEPA 2004.
except for CO2 EFs, which were derived from Table C-1 of the MRR
and CH4 and N2O Efs which also use data derived from Table C-2 of the MRR (use of diesel as fuel is assumed).
Diesel engines consume about 1 gallon per hour for every 18 hp used

Construction worker commutes assume 4 miles per day for travel within Nellis AFB, during breaks,
and at lunchtime. Also assumed that these are existing construction workers in Las Vegas,
no new additional workers would be required thus no new commuting to and from work would be incurred.

2011 Total area 362,823 SF 8.33 AC

Construct Thunder Aircraft Maintenance Unit 11,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	11	45	141	16	7	16287.86	0.66	0.13
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	3	13	41	4	2	4679.85	0.19	0.04
Skid steer loader	2	4	22	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	3	14	33	6	3	7299.58	0.29	0.06
Backhoe/loader	1	6	22	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	6	21	41	5	4	16015.49	0.65	0.13
Small diesel engines	1	4	22	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	3	4	1	0	1089.49	0.04	0.01
Dump truck	8	1	7	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	5	19	60	6	3	2383.26	0.10	0.02
													Subtotal	29	116	320	38	19	47756	2	0

Foundation (slab)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	5	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	4	1	0	829.50	0.03	0.01
Concrete truck	4	1	7	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	9	27	3	1	2166.60	0.09	0.02
Dump truck	4	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	21	2	1	1702.33	0.07	0.01
Delivery truck	6	6	5	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	10	41	126	13	6	6685.50	0.27	0.05
Backhoe/loader	1	8	5	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	6	13	2	1	4853.18	0.20	0.04
Small diesel engines	2	2	24	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	4	5	1	0	594.27	0.02	0.00
													Subtotal	17	68	195	22	10	16831	1	0

Structure						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	4	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	2	0	0	198.09	0.01	0.00
Delivery truck	1	2	11	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	15	2	1	4902.70	0.20	0.04
Skid steer loader	2	4	18	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	3	12	27	5	2	5972.38	0.24	0.05
Dump truck	2	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	1361.86	0.06	0.01
Crane	1	8	6	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	5	31	5	2	7131.20	0.29	0.06
													Subtotal	7	25	84	12	5	19566	1	0

Construct 6-Bay F-35 Hangar/Aircraft Maintence Unit 80,988 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	9	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	9	37	115	13	6	13326.43	0.54	0.11
Grader	1	4	9	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	4	17	52	6	2	6016.95	0.24	0.05
Skid steer loader	2	4	56	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	8	36	85	14	7	18580.74	0.75	0.15
Backhoe/loader	1	6	56	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	15	53	105	13	11	40766.69	1.65	0.33
Small diesel engines	1	4	56	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	9	11	2	1	2773.24	0.11	0.02
Dump truck	8	1	9	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	6	25	77	8	4	3064.19	0.12	0.02
													Subtotal	44	177	446	56	31	84528	3	1

Foundation (slab)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	51	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	16	39	6	3	8460.87	0.34	0.07
Concrete truck	5	1	34	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	13	53	165	18	8	10523.47	0.43	0.09
Dump truck	6	1	21	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	11	43	134	14	6	7149.77	0.29	0.06
Delivery truck	1	1	111	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	6	25	78	8	4	24736.35	1.00	0.20
Backhoe/loader	1	8	21	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	8	27	53	6	6	20383.35	0.82	0.16
Small diesel engines	2	2	141	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	4	22	28	5	2	3491.32	0.14	0.03
													Subtotal	46	186	496	58	29	74745	3	1

Structure						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	60	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	3	19	24	4	2	2971.33	0.12	0.02
Delivery truck	1	2	71	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	8	32	99	11	5	31644.70	1.28	0.26
Skid steer loader	2	4	229	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	32	147	348	58	29	75981.95	3.07	0.61
Concrete truck	4	2	34	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	21	85	264	28	13	21046.94	0.85	0.17
Crane	1	8	38	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	12	30	195	32	10	45164.27	1.82	0.36
													Subtotal	77	313	931	133	59	176809	7	1

F-35 Beddown Construction Air Emissions

Construct Aircraft Washrack Addition, 1-bay to Building 271 9,551 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	8	26	3	1	2961.43	0.12	0.02
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	12	1	1	1337.10	0.05	0.01
Skid steer loader	2	4	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	6	15	3	1	3317.99	0.13	0.03
Backhoe/loader	1	6	10	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	3	10	19	2	2	7279.77	0.29	0.06
Small diesel engines	1	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	495.22	0.02	0.00
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	6	17	2	1	680.93	0.03	0.01
													Subtotal	9	35	90	11	6	16072	1	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	4	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	3	1	0	663.60	0.03	0.01
Concrete truck	4	4	4	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	5	20	62	7	3	4952.22	0.20	0.04
Dump truck	6	6	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	6	25	77	8	4	4085.58	0.17	0.03
Delivery truck	1	1	10	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	2	7	1	0	2228.50	0.09	0.02
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	5	1	1	1941.27	0.08	0.02
Small diesel engines	2	2	16	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	3	1	0	396.18	0.02	0.00
													Subtotal	13	53	157	17	8	14267	1	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	8	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	3	1	0	396.18	0.02	0.00
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	22	2	1	7131.20	0.29	0.06
Concrete truck	4	4	4	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	5	20	62	7	3	4952.22	0.20	0.04
Skid steer loader	2	4	28	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	18	43	7	4	9290.37	0.38	0.08
Crane	1	8	3	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	1	2	15	3	1	3565.60	0.14	0.03
													Subtotal	12	50	146	19	9	25336	1	0

Construct Munitions Facility Addition at Building 10425 3,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	1	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	0	2	3	0	0	445.70	0.02	0.00
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	0	2	6	1	0	668.55	0.03	0.01
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	995.40	0.04	0.01
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	6	1	1	2183.93	0.09	0.02
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	1	0	0	148.57	0.01	0.00
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	340.47	0.01	0.00
													Subtotal	3	11	28	4	2	4783	0	0

Foundation (slal

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	0	1	0	0	165.90	0.01	0.00
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	16	2	1	1238.06	0.05	0.01
Dump truck	6	6	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	38	4	2	2042.79	0.08	0.02
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	2	0	0	668.55	0.03	0.01
Backhoe/loader	1	2	1	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	0	1	0	0	242.66	0.01	0.00
Small diesel engines	2	2	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	123.81	0.01	0.00
													Subtotal	5	19	58	6	3	4482	0	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	0	0	0	49.52	0.00	0.00
Delivery truck	1	2	1	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	0	1	0	0	445.70	0.02	0.00
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	16	2	1	1238.06	0.05	0.01
Skid steer loader	2	4	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	3	1	0	663.60	0.03	0.01
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	0	1	5	1	0	1188.53	0.05	0.01
													Subtotal	2	8	25	3	1	3585	0	0

Flight Test Instrumentation Facility 4650 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	2	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	1	2	5	1	1	668.55	0.03	0.01
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	3	9	1	0	1002.83	0.04	0.01
Skid steer loader	2	4	5	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	7	1	1	1526.27	0.06	0.01
Backhoe/loader	1	6	5	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	4	9	1	1	3348.69	0.14	0.03
Small diesel engines	1	4	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	227.80	0.01	0.00
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	13	1	1	510.70	0.02	0.00
													Subtotal	4	17	43	5	3	7285	0	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	0	1	0	0	248.85	0.01	0.00
Concrete truck	4	4	2	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	23	2	1	1857.08	0.08	0.02
Dump truck	6	6	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	5	19	58	6	3	3064.19	0.12	0.02
Delivery truck	1	1	5	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	3	0	0	1025.11	0.04	0.01
Backhoe/loader	1	2	2	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	0	1	0	0	363.99	0.01	0.00
Small diesel engines	2	2	8	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	2	0	0	191.90	0.01	0.00
													Subtotal	7	29	88	10	4	6751	0	0

F-35 Beddown Construction Air Emissions

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	2	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	1	0	0	74.28	0.00	0.00
Delivery truck	1	2	2	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	2	0	0	668.55	0.03	0.01
Concrete truck	4	4	2	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	23	2	1	1857.08	0.08	0.02
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	1028.58	0.04	0.01
Crane	1	8	2	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	0	1	8	1	0	1782.80	0.07	0.01
													Subtotal	3	12	38	5	2	5411	0	0

Construct 25-mm Munitions Storage Facility Addition at M81 3,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	1	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	0	2	3	0	0	445.70	0.02	0.00
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	0	2	6	1	0	668.55	0.03	0.01
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	995.40	0.04	0.01
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	6	1	1	2183.93	0.09	0.02
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	1	0	0	148.57	0.01	0.00
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	340.47	0.01	0.00
													Subtotal	3	11	28	4	2	4783	0	0

Foundation (slal

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	0	1	0	0	165.90	0.01	0.00
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	16	2	1	1238.06	0.05	0.01
Dump truck	6	6	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	38	4	2	2042.79	0.08	0.02
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	2	0	0	668.55	0.03	0.01
Backhoe/loader	1	2	1	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	0	1	0	0	242.66	0.01	0.00
Small diesel engines	2	2	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	123.81	0.01	0.00
													Subtotal	5	19	58	6	3	4482	0	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	0	0	0	49.52	0.00	0.00
Delivery truck	1	2	1	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	0	1	0	0	445.70	0.02	0.00
Concrete truck	4	4	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	16	2	1	1238.06	0.05	0.01
Skid steer loader	2	4	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	3	1	0	663.60	0.03	0.01
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	0	1	5	1	0	1188.53	0.05	0.01
													Subtotal	2	8	25	3	1	3585	0	0

Construct Munitions Trailer Facility 10,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	11	45	141	16	7	16287.86	0.66	0.13
Grader	1	4	10	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	19	58	6	3	6685.50	0.27	0.05
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	19	46	8	4	9953.97	0.40	0.08
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	8	29	56	7	6	21839.30	0.88	0.18
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	1485.67	0.06	0.01
Dump truck	8	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	8	30	94	10	5	3745.12	0.15	0.03
													Subtotal	37	147	401	48	24	59997	2	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	4	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	3	1	0	663.60	0.03	0.01
Concrete truck	4	1	5	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	6	19	2	1	1547.57	0.06	0.01
Dump truck	6	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	6	19	2	1	1021.40	0.04	0.01
Delivery truck	6	6	3	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	6	24	75	8	4	4011.30	0.16	0.03
Backhoe/loader	1	8	3	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	4	8	1	1	2911.91	0.12	0.02
Small diesel engines	2	2	18	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	3	4	1	0	445.70	0.02	0.00
													Subtotal	11	45	128	14	7	10601	0	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	148.57	0.01	0.00
Delivery truck	1	2	8	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	11	1	1	3565.60	0.14	0.03
Skid steer loader	2	4	13	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	8	20	3	2	4313.39	0.17	0.03
Dump truck	3	2	7	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	14	45	5	2	4766.51	0.19	0.04
Crane	1	8	6	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	5	31	5	2	7131.20	0.29	0.06
													Subtotal	8	32	108	15	6	19925	1	0

Construct Two (2) Loading Docks 1,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	1	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	13	1	1	1480.71	0.06	0.01
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	0	2	6	1	0	668.55	0.03	0.01
Skid steer loader	2	4	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	995.40	0.04	0.01
Backhoe/loader	1	6	3	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	6	1	1	2183.93	0.09	0.02
Small diesel engines	1	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	1	0	0	148.57	0.01	0.00
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	340.47	0.01	0.00
													Subtotal	4	14	38	5	2	5818	0	0

F-35 Beddown Construction Air Emissions

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	1	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	0	1	0	0	165.90	0.01	0.00
Concrete truck	4	1	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	4	0	0	309.51	0.01	0.00
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	340.47	0.01	0.00
Delivery truck	1	1	1	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	0	1	0	0	222.85	0.01	0.00
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	1	3	0	0	970.64	0.04	0.01
Small diesel engines	2	2	1	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	0	0	0	24.76	0.00	0.00
													Subtotal	2	6	17	2	1	2034	0	0

Construct Precision-Guided Missile Bay Addition at Building 10439 3,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	8	26	3	1	2961.43	0.12	0.02
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	12	1	1	1337.10	0.05	0.01
Skid steer loader	2	4	7	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	5	11	2	1	2322.59	0.09	0.02
Backhoe/loader	1	6	7	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	7	13	2	1	5095.84	0.21	0.04
Small diesel engines	1	4	7	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	346.66	0.01	0.00
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	6	17	2	1	680.93	0.03	0.01
													Subtotal	7	30	79	10	5	12745	1	0

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	3	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	2	0	0	497.70	0.02	0.00
Concrete truck	5	1	1	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	2	5	1	0	309.51	0.01	0.00
Dump truck	5	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	2	5	1	0	340.47	0.01	0.00
Delivery truck	1	1	3	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	2	0	0	668.55	0.03	0.01
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	1	3	0	0	970.64	0.04	0.01
Small diesel engines	2	2	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	0	1	0	0	74.28	0.00	0.00
													Subtotal	2	7	18	2	1	2861	0	0

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	2	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	99.04	0.00	0.00
Delivery truck	1	1	4	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	3	0	0	891.40	0.04	0.01
Skid steer loader	2	4	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	4	9	2	1	1990.79	0.08	0.02
Dump truck	2	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	4	0	0	680.93	0.03	0.01
Crane	1	8	2	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	1	2	10	2	1	2377.07	0.10	0.02
													Subtotal	2	8	27	4	2	6039	0	0

422 Test Evaluation Squadron Operations Facility 20,300 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	22	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	23	91	282	31	14	32575.72	1.32	0.26
Grader	1	4	20	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	9	37	116	13	6	13371.00	0.54	0.11
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	9	39	91	15	8	19907.93	0.80	0.16
Backhoe/loader	1	6	60	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	16	57	113	14	12	43678.60	1.76	0.35
Small diesel engines	1	4	60	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	9	12	2	1	2971.33	0.12	0.02
Dump truck	8	1	22	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	15	61	188	20	9	7490.24	0.30	0.06
													Subtotal	74	294	801	95	49	119995	5	1

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	6	1	1	1327.20	0.05	0.01
Concrete truck	4	1	10	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	13	39	4	2	3095.14	0.13	0.03
Dump truck	6	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	38	4	2	2042.79	0.08	0.02
Delivery truck	6	6	6	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	12	49	151	16	7	8022.60	0.32	0.06
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	8	15	2	2	5823.81	0.24	0.05
Small diesel engines	2	2	36	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	6	7	1	1	891.40	0.04	0.01
													Subtotal	22	89	256	28	14	21203	1	0

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	297.13	0.01	0.00
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	22	2	1	7131.20	0.29	0.06
Skid steer loader	2	4	26	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	17	40	7	3	8626.77	0.35	0.07
Dump truck	3	2	14	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	7	29	90	10	4	9533.03	0.39	0.08
Crane	1	8	12	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	4	9	62	10	3	14262.40	0.58	0.12
													Subtotal	17	64	216	29	12	39851	2	0

Flight Simulator Facility 20,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O	VOC	CO	NOx	SO_2	PM	CO_2	CH_4	N_2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	22	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	23	91	282	31	14	32575.72	1.32	0.26
Grader	1	4	20	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	9	37	116	13	6	13371.00	0.54	0.11
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	9	39	91	15	8	19907.93	0.80	0.16
Backhoe/loader	1	6	60	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	16	57	113	14	12	43678.60	1.76	0.35
Small diesel engines	1	4	60	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	9	12	2	1	2971.33	0.12	0.02
Dump truck	8	1	22	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	15	61	188	20	9	7490.24	0.30	0.06
													Subtotal	74	294	801	95	49	119995	5	1

F-35 Beddown Construction Air Emissions

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	6	1	1	1327.20	0.05	0.01
Concrete truck	4	1	10	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	13	39	4	2	3095.14	0.13	0.03
Dump truck	6	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	38	4	2	2042.79	0.08	0.02
Delivery truck	6	6	6	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	12	49	151	16	7	8022.60	0.32	0.06
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	8	15	2	2	5823.81	0.24	0.05
Small diesel engines	2	2	36	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	6	7	1	1	891.40	0.04	0.01
													Subtotal	22	89	256	28	14	21203	1	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	297.13	0.01	0.00
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	22	2	1	7131.20	0.29	0.06
Skid steer loader	2	4	26	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	17	40	7	3	8626.77	0.35	0.07
Dump truck	3	2	14	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	7	29	90	10	4	9533.03	0.39	0.08
Crane	1	8	12	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	4	9	62	10	3	14262.40	0.58	0.12
													Subtotal	17	64	216	29	12	39851	2	0

Construct parking areas 15,656 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	12	1	1	1337.10	0.05	0.01
Roller	2	4	2	30	0.59	1.8	5	6.9	1.00	0.8	22.29	0.0009	0.00018	1	3	4	1	0	297.13	0.01	0.00
Paver	1	4	2	107	0.59	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	3	9	1	0	1059.78	0.04	0.01
Concrete truck	4	3	3	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	35	4	2	2785.63	0.11	0.02
Delivery truck	1	2	3	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	4	0	0	1337.10	0.05	0.01
Small diesel engines	4	6	5	25	0.43	0.7628	4.1127	5.2298	0.93	0.9	22.29	0.0009	0.00018	2	12	15	3	3	928.54	0.04	0.01
													Subtotal	8	34	79	10	6	7,745	0	0

Volume of hot mix asphalt	5213	ft^3
Average density of HMA	145	lb/ft^3
CARB EF for HMA	0.04	lb/ton
VOC emissions from HMA paving	15	lb

Demolish Bldgs 265, 268, 269 180,678 SF — 6324 tons of debris, 486 truckloads

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	2	8	89	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	165	582	1,150	155	120	79334.60	3.20	0.64
Skid steer loader	3	8	89	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	38	172	406	67	34	59060.20	2.39	0.48
Crane	3	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	5	12	77	13	4	5942.67	0.24	0.05
													Subtotal	207	765	1,634	235	159	144,337	6	1

Equipment	Number	Hr/day	# days	Hp		VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Backhoe/loader	8	14	25	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	126	443	877	108	92	42465.31	1.72	0.34
Skid steer loader	8	14	25	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	50	225	533	88	45	29032.40	1.17	0.23
Dump truck	32	4	25	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	277	1,100	3,414	363	164	34046.53	1.38	0.28
													Subtotal	452	1,768	4,823	559	300	105,544	4	1

Truck transport of debris to disposal site

Equipment	Number	# days	Trip Length	VOC lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM_{10} lb/mi	$PM_{2.5}$ lb/mi	CO2 lb/mi	ROG lb	CO lb	NOx lb	SOx lb	PM_{10} lb	$PM_{2.5}$ lb	CO2 lb
Trucks	16	30	30	0.00373	0.01446	0.05	0.00004	0.00231	0.00204	3.12	54	208	679	1	33	29	44,928

Construction Worker POVs

	Number	# days	Trip Length	VOC lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	VOC lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
2011	540	250	4	0.001787368	0.02357804	0.001358	1.8078E-05	5.48942E-05	0.9328909	965.18	12732.14	733.33	9.76	29.64	503761
2012	480	180	4	0.001625882	0.02233796	0.0012423	1.8078E-05	5.4784E-05	0.9332216	561.90	7720.00	429.33	6.25	18.93	322521

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}$/ PM_{10} Ratio	$PM_{2.5}$ Total
0.42	1.0	200	2.8	0.1	0.3

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$	CO2	CH4	N2O	Metric Tons/yr CO_2e
2011 Annual Total in Tons	0.88	7.90	4.52	0.49	1.96	0.45	643.60	0.02	0.00	585
2012 Annual Total in Tons	0.55	4.88	2.98	0.33	1.31	1.31	513.03	0.01	0.00	466

F-35 Beddown Construction Air Emissions

2012 Total area 74,000 SF 1.70 AC

Construct Aerospace Ground Equipment Complex 45,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	11	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	11	45	141	16	7	16287.86	0.66	0.13
Grader	1	4	10	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	19	58	6	3	6685.50	0.27	0.05
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	19	46	8	4	9953.97	0.40	0.08
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	8	29	56	7	6	21839.30	0.88	0.18
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	1485.67	0.06	0.01
Dump truck	8	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	8	30	94	10	5	3745.12	0.15	0.03
													Subtotal	37	147	401	48	24	59997	2	0

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	81	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	6	26	62	10	5	13437.86	0.54	0.11
Concrete truck	4	1	108	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	34	135	419	45	20	33427.50	1.35	0.27
Dump truck	6	1	54	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	28	111	346	37	17	18385.13	0.74	0.15
Delivery truck	6	6	54	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	110	437	1358	144	65	72203.40	2.92	0.58
Backhoe/loader	1	8	54	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	19	68	135	17	14	52414.32	2.12	0.42
Small diesel engines	2	2	365	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	11	57	72	13	6	9037.81	0.37	0.07
													Subtotal	208	835	2392	265	127	198906	8	2

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	742.83	0.03	0.01
Delivery truck	1	2	36	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	16	50	5	2	16045.20	0.65	0.13
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	9	39	91	15	8	19907.93	0.80	0.16
Dump truck	3	2	30	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	16	62	192	20	9	20427.92	0.83	0.17
Crane	1	8	24	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	7	19	123	20	6	28524.80	1.15	0.23
													Subtotal	36	140	463	62	26	85649	3	1

Construct Test Operations Building 20,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	5	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	21	64	7	3	7403.57	0.30	0.06
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	6	17	2	1	2005.65	0.08	0.02
Skid steer loader	2	4	9	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	6	14	2	1	2986.19	0.12	0.02
Backhoe/loader	1	6	9	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	9	17	2	2	6551.79	0.26	0.05
Small diesel engines	1	4	9	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	2	0	0	445.70	0.02	0.00
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	26	3	1	1021.40	0.04	0.01
													Subtotal	13	50	139	16	8	20414	1	0

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	9	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	7	1	1	1493.10	0.06	0.01
Concrete truck	8	1	6	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	15	47	5	2	1857.08	0.08	0.02
Dump truck	6	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	38	4	2	2042.79	0.08	0.02
Delivery truck	1	1	18	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	13	1	1	4011.30	0.16	0.03
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	8	15	2	2	5823.81	0.24	0.05
Small diesel engines	2	2	32	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	792.36	0.03	0.01
													Subtotal	12	47	126	14	7	16020	1	0

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	10	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	3	4	1	0	495.22	0.02	0.00
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	17	2	1	5348.40	0.22	0.04
Skid steer loader	2	4	38	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	5	24	58	10	5	12608.36	0.51	0.10
Concrete truck	4	2	7	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	18	54	6	3	4333.19	0.18	0.04
Crane	1	8	10	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	3	8	51	8	3	11885.33	0.48	0.10
													Subtotal	15	58	184	26	11	34671	1	0

Construct Engine Shop Addition 9,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	1	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	13	1	1	1480.71	0.06	0.01
Grader	1	4	1	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	0	2	6	1	0	668.55	0.03	0.01
Skid steer loader	2	4	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	4	9	2	1	1990.79	0.08	0.02
Backhoe/loader	1	6	6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	6	11	1	1	4367.86	0.18	0.04
Small diesel engines	1	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	297.13	0.01	0.00
Dump truck	8	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	340.47	0.01	0.00
													Subtotal	5	19	49	6	3	9146	0	0

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	2	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	1	2	0	0	331.80	0.01	0.00
Concrete truck	4	1	5	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	6	19	2	1	1547.57	0.06	0.01
Dump truck	6	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	13	1	1	680.93	0.03	0.01
Delivery truck	6	6	2	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	16	50	5	2	2674.20	0.11	0.02
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	5	1	1	1941.27	0.08	0.02
Small diesel engines	2	2	11	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	272.37	0.01	0.00
													Subtotal	8	31	91	10	5	7448	0	0

F-35 Beddown Construction Air Emissions

Structure						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	2	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	99.04	0.00	0.00
Delivery truck	1	2	5	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	2	7	1	0	2228.50	0.09	0.02
Skid steer loader	2	4	7	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	5	11	2	1	2322.59	0.09	0.02
Dump truck	2	1	1	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	2	0	0	340.47	0.01	0.00
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	4	26	4	1	5942.67	0.24	0.05
													Subtotal	3	12	46	7	3	10933	0	0

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	1.0	50	0.7	0.1	0.1

Construction Worker POVs

Number	# days	Trip Length	VOC lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	VOC lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
177	250	4	0.00	0.02	0.00	0.00	0.00	0.93	287.8	3953.8	219.9	3.2	9.7	165180

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$	CO2	CH4	N2O	Metric Tons/yr CO_2e
2012 Annual Total in Tons	0.31	2.65	2.06	0.23	0.81	0.18	304.18	0.01	0.00	277

2013 Total area 247,886 SF 5.69 AC

Weapons School Addition at Bldg 282 10,000 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	2	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	8	26	3	1	2961.43	0.12	0.02
Grader	1	4	2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	4	12	1	1	1337.10	0.05	0.01
Skid steer loader	2	4	5	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	8	1	1	1658.99	0.07	0.01
Backhoe/loader	1	6	5	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	5	9	1	1	3639.88	0.15	0.03
Small diesel engines	1	4	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	247.61	0.01	0.00
Dump truck	8	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	6	17	2	1	680.93	0.03	0.01
													Subtotal	7	26	72	9	4	10526	0	0

Foundation (slab)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	10	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	8	1	1	1658.99	0.07	0.01
Concrete truck	4	1	13	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	16	50	5	2	4023.68	0.16	0.03
Dump truck	4	1	10	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	14	43	5	2	3404.65	0.14	0.03
Delivery truck	6	6	10	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	20	81	251	27	12	13371.00	0.54	0.11
Backhoe/loader	1	8	10	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	4	13	25	3	3	9706.36	0.39	0.08
Small diesel engines	2	2	40	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	6	8	1	1	990.44	0.04	0.01
													Subtotal	33	133	385	42	20	33155	1	0

Structure						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	3	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	148.57	0.01	0.00
Delivery truck	1	2	8	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	11	1	1	3565.60	0.14	0.03
Skid steer loader	2	4	13	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	8	20	3	2	4313.39	0.17	0.03
Dump truck	2	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	2	6	1	0	1021.40	0.04	0.01
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	4	26	4	1	5942.67	0.24	0.05
													Subtotal	5	19	64	10	4	14992	1	0

Alternate Mission Equipment Storage Facility 25,285 sq ft

Site prep (grading, drainage, utilities etc.)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	27.72	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	29	114	355	39	17	41045.40	1.66	0.33
Grader	1	4	25.2	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	12	47	146	16	7	16847.46	0.68	0.14
Skid steer loader	2	4	75.6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	11	49	115	19	10	25084.00	1.01	0.20
Backhoe/loader	1	6	75.6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	20	72	142	17	15	55035.04	2.22	0.44
Small diesel engines	1	4	75.6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	12	15	3	1	3743.88	0.15	0.03
Dump truck	8	1	27.72	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	19	76	237	25	11	9437.70	0.38	0.08
													Subtotal	93	370	1010	120	61	151193	6	1

Foundation (slab)						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	10.08	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	8	1	1	1672.27	0.07	0.01
Concrete truck	4	1	12.6	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	16	49	5	2	3899.88	0.16	0.03
Dump truck	6	1	7.56	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	16	48	5	2	2573.92	0.10	0.02
Delivery truck	6	6	7.56	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	15	61	190	20	9	10108.48	0.41	0.08
Backhoe/loader	1	8	7.56	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	3	10	19	2	2	7338.00	0.30	0.06
Small diesel engines	2	2	45.36	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	7	9	2	1	1123.16	0.05	0.01
													Subtotal	28	112	323	36	17	26716	1	0

Structure						VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	7.56	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	3	1	0	374.39	0.02	0.00
Delivery truck	1	2	20.16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	9	28	3	1	8985.31	0.36	0.07
Skid steer loader	2	4	32.76	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	5	21	50	8	4	10869.73	0.44	0.09
Dump truck	3	2	17.64	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	9	36	113	12	5	12011.62	0.49	0.10
Crane	1	8	15.12	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	5	12	78	13	4	17970.62	0.73	0.15
													Subtotal	21	81	272	37	15	50212	2	0

F-35 Beddown Construction Air Emissions

Fuel Cell Hangar Addition — 16,300 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	17.93	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	19	74	230	26	11	26549.21	1.07	0.21
Grader	1	4	16.3	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	8	30	94	10	5	10897.37	0.44	0.09
Skid steer loader	2	4	48.9	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	7	31	74	12	6	16224.97	0.66	0.13
Backhoe/loader	1	6	48.9	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	13	46	92	11	10	35598.06	1.44	0.29
Small diesel engines	1	4	48.9	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	8	10	2	1	2421.64	0.10	0.02
Dump truck	8	1	17.93	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	12	49	153	16	7	6104.54	0.25	0.05
													Subtotal	60	239	653	78	40	97796	4	1

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	6.52	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	1081.66	0.04	0.01
Concrete truck	4	1	8.15	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	10	32	3	2	2522.54	0.10	0.02
Dump truck	6	1	4.89	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	10	31	3	2	1664.88	0.07	0.01
Delivery truck	6	6	4.89	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	10	40	123	13	6	6538.42	0.26	0.05
Backhoe/loader	1	8	4.89	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	6	12	2	1	4746.41	0.19	0.04
Small diesel engines	2	2	29.34	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	0	726.49	0.03	0.01
													Subtotal	18	73	209	23	11	17280	1	0

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	4.89	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	242.16	0.01	0.00
Delivery truck	1	2	13.04	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	6	18	2	1	5811.93	0.23	0.05
Skid steer loader	2	4	21.19	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	3	14	32	5	3	7030.82	0.28	0.06
Dump truck	3	2	11.41	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	6	24	73	8	4	7769.42	0.31	0.06
Crane	1	8	9.78	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	3	8	50	8	2	11623.86	0.47	0.09
													Subtotal	14	52	176	24	10	32478	1	0

Munitions Maintenance Facility — 6,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	4	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	4	17	51	6	2	5922.86	0.24	0.05
Grader	1	4	4	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	7	23	3	1	2674.20	0.11	0.02
Skid steer loader	2	4	14	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	9	21	4	2	4645.18	0.19	0.04
Backhoe/loader	1	6	14	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	4	13	26	3	3	10191.67	0.41	0.08
Small diesel engines	1	4	14	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	3	0	0	693.31	0.03	0.01
Dump truck	8	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	34	4	2	1361.86	0.06	0.01
													Subtotal	15	59	159	19	10	25489	1	0

Foundation (slab)

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	995.40	0.04	0.01
Concrete truck	5	1	2	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	10	1	0	619.03	0.03	0.01
Dump truck	5	1	2	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	11	1	1	680.93	0.03	0.01
Delivery truck	1	1	6	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	1	4	0	0	1337.10	0.05	0.01
Backhoe/loader	1	8	2	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	3	5	1	1	1941.27	0.08	0.02
Small diesel engines	2	2	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	1	0	0	148.57	0.01	0.00
													Subtotal	3	13	35	4	2	5722	0	0

Structure

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	4	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	1	2	0	0	198.09	0.01	0.00
Delivery truck	1	1	8	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	0	2	6	1	0	1782.80	0.07	0.01
Skid steer loader	2	4	12	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	8	18	3	2	3981.59	0.16	0.03
Dump truck	2	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	3	9	1	0	1361.86	0.06	0.01
Crane	1	8	4	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	1	3	21	3	1	4754.13	0.19	0.04
													Subtotal	4	17	55	8	3	12078	0	0

Construct Parking Areas — 190,301 sq ft

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	3	13	41	4	2	4679.85	0.19	0.04
Roller	2	4	7	30	0.59	1.8	5	6.9	1.00	0.8	22.29	0.0009	0.00018	4	11	15	2	2	1039.97	0.04	0.01
Paver	1	8	7	107	0.59	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	21	65	7	3	7418.43	0.30	0.06
Concrete truck	4	3	16	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	15	60	186	20	9	14856.67	0.60	0.12
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	22	2	1	7131.20	0.29	0.06
Small diesel engines	4	6	32	25	0.43	1.7	5	8.5	0.93	0.9	22.29	0.0009	0.00018	31	91	155	17	16	5942.67	0.24	0.05
													Subtotal	60	203	484	53	33	41069	2	0

Volume of hot mix asphalt	63,270 ft^3
Average density of HMA	145 lb/ft^3
CARB EF for HMA	0.04 lb/ton
VOC emissions from HMA paving	183 lb

Pavement Marking 2,000 LF

4" Solid Line= 215 ft/gal VOC content of paint = 1.3 lb/gal

VOC lb
12

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	1.0	136	1.9	0.1	0.2

F-35 Beddown Construction Air Emissions

Construction Worker POVs

	Number	# days	Trip Length	VOC lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	VOC lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
2013	214	200	4	0.001504078	0.021412037	0.0011304	1.8078E-05	5.47852E-05	0.9329147	257.5	3665.7	193.5	3.1	9.4	159715
2014	214	94	4	0.001402116	0.020629409	0.00103505	1.8078E-05	5.48942E-05	0.9337728	112.8	1659.9	83.3	1.5	4.4	75135

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$	CO2	CH4	N2O	Metric Tons/yr CO_2e
2013 Annual Total in Tons	0.32	2.31	1.42	0.16	1.99	0.27	256.22	0.01	0.00	233
2014 Annual Total in Tons	0.15	1.05	0.67	0.08	1.94	0.23	162.85	0.00	0.00	148

2014 Total area 1,008,547 SF 23.15 AC

Construct Low Observables Composite Addition 11,018 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	10	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	10	41	128	14	6	14807.14	0.60	0.12
Grader	1	4	9	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	4	17	52	6	2	6016.95	0.24	0.05
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	19	46	8	4	9953.97	0.40	0.08
Backhoe/loader	1	6	30	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	8	29	56	7	6	21839.30	0.88	0.18
Small diesel engines	1	4	30	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	1485.67	0.06	0.01
Dump truck	8	1	10	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	7	28	85	9	4	3404.65	0.14	0.03
													Subtotal	35	138	374	45	23	57508	2	0

Foundation

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	6	1	1	1327.20	0.05	0.01
Concrete truck	4	4	10	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	13	50	155	16	7	12380.56	0.50	0.10
Dump truck	6	6	5	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	16	62	192	20	9	10213.96	0.41	0.08
Delivery truck	1	1	22	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	15	2	1	4902.70	0.20	0.04
Backhoe/loader	1	8	1	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	0	1	3	0	0	970.64	0.04	0.01
Small diesel engines	2	2	35	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	7	1	1	866.64	0.04	0.01
													Subtotal	30	121	371	40	18	29795	1	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	20	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	6	8	1	1	990.44	0.04	0.01
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	17	2	1	5348.40	0.22	0.04
Skid steer loader	2	4	60	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	9	39	91	15	8	19907.93	0.80	0.16
Dump truck	6	6	15	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	47	186	576	61	28	30641.88	1.24	0.25
Crane	1	8	5	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	4	26	4	1	5942.67	0.24	0.05
													Subtotal	59	240	718	84	38	62831	3	1

Construct 4-Bay F-35 Hangar/Strike Aircraft Maintenance Unit Building 31,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	8	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	8	33	103	11	5	11845.72	0.48	0.10
Grader	1	4	5	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	9	29	3	1	3342.75	0.14	0.03
Skid steer loader	2	4	15	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	10	23	4	2	4976.98	0.20	0.04
Backhoe/loader	1	6	15	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	4	14	28	3	3	10919.65	0.44	0.09
Small diesel engines	1	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	3	1	0	742.83	0.03	0.01
Dump truck	8	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	14	43	5	2	1702.33	0.07	0.01
													Subtotal	21	82	228	27	13	33530	1	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	6	15	3	1	3317.99	0.13	0.03
Concrete truck	5	1	13	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	5	20	63	7	3	4023.68	0.16	0.03
Dump truck	6	1	8	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	4	17	51	5	2	2723.72	0.11	0.02
Delivery truck	1	1	44	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	10	31	3	1	9805.40	0.40	0.08
Backhoe/loader	1	8	8	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	3	10	20	2	2	7765.08	0.31	0.06
Small diesel engines	2	2	50	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	8	10	2	1	1238.06	0.05	0.01
													Subtotal	18	71	190	22	11	28874	1	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	21	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	7	8	1	1	1039.97	0.04	0.01
Delivery truck	1	2	25	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	35	4	2	11142.50	0.45	0.09
Skid steer loader	2	4	86	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	12	55	131	22	11	28534.70	1.15	0.23
Concrete truck	4	2	15	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	9	38	116	12	6	9285.42	0.38	0.08
Crane	1	8	15	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	5	12	77	13	4	17828.00	0.72	0.14
													Subtotal	30	122	368	52	23	67831	3	1

Low Observable Corrosion/Wash 3-Bay Hangar 15,800 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	3	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	3	12	38	4	2	4442.14	0.18	0.04
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	6	17	2	1	2005.65	0.08	0.02
Skid steer loader	2	4	11	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	7	17	3	1	3649.79	0.15	0.03
Backhoe/loader	1	6	11	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	3	10	21	3	2	8007.74	0.32	0.06
Small diesel engines	1	4	11	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	544.74	0.02	0.00
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	26	3	1	1021.40	0.04	0.01
													Subtotal	11	45	121	15	8	19671	1	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	8	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	3	6	1	1	1327.20	0.05	0.01
Concrete truck	4	1	9	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	35	4	2	2785.63	0.11	0.02
Dump truck	7	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	12	37	4	2	1702.33	0.07	0.01
Delivery truck	6	6	5	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	10	41	126	13	6	6685.50	0.27	0.05
Backhoe/loader	1	8	5	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	6	13	2	1	4853.18	0.20	0.04
Small diesel engines	2	2	24	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	4	5	1	0	594.27	0.02	0.00
													Subtotal	19	76	221	24	12	17948	1	0

F-35 Beddown Construction Air Emissions

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	6	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	297.13	0.01	0.00
Delivery truck	1	2	12	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	17	2	1	5348.40	0.22	0.04
Skid steer loader	2	4	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	3	13	30	5	3	6635.98	0.27	0.05
Dump truck	2	1	11	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	23	2	1	3745.12	0.15	0.03
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	6	41	7	2	9508.27	0.38	0.08
													Subtotal	9	34	114	17	7	25535	1	0

Construct Weapons Release Building 15,000 sq ft

Site prep (grading, drainage, utilities etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	3	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	3	12	38	4	2	4442.14	0.18	0.04
Grader	1	4	3	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	1	6	17	2	1	2005.65	0.08	0.02
Skid steer loader	2	4	17	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	11	26	4	2	5640.58	0.23	0.05
Backhoe/loader	1	6	17	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	5	16	32	4	3	12375.60	0.50	0.10
Small diesel engines	1	4	17	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	3	3	1	0	841.88	0.03	0.01
Dump truck	8	1	3	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	26	3	1	1021.40	0.04	0.01
													Subtotal	14	56	143	18	10	26327	1	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	6	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	0	2	5	1	0	995.40	0.04	0.01
Concrete truck	4	1	8	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	10	31	3	1	2476.11	0.10	0.02
Dump truck	4	1	6	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	26	3	1	2042.79	0.08	0.02
Delivery truck	6	6	4	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	8	32	101	11	5	5348.40	0.22	0.04
Backhoe/loader	1	8	6	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	2	8	15	2	2	5823.81	0.24	0.05
Small diesel engines	2	2	26	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	4	5	1	0	643.79	0.03	0.01
													Subtotal	16	64	182	20	10	17330	1	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	5	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	0	2	2	0	0	247.61	0.01	0.00
Delivery truck	1	2	11	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	15	2	1	4902.70	0.20	0.04
Skid steer loader	2	4	17	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	2	11	26	4	2	5640.58	0.23	0.05
Dump truck	3	4	9	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	9	37	115	12	6	12256.75	0.50	0.10
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	6	41	7	2	9508.27	0.38	0.08
													Subtotal	16	61	200	25	11	32556	1	0

Construct Parts Store 40,000 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	4	4	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	4	17	51	6	2	5922.86	0.24	0.05
Grader	1	4	4	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	7	23	3	1	2674.20	0.11	0.02
Skid steer loader	2	4	28	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	18	43	7	4	9290.37	0.38	0.08
Backhoe/loader	1	6	28	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	8	27	53	6	6	20383.35	0.82	0.16
Small diesel engines	1	4	28	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	4	6	1	0	1386.62	0.06	0.01
Dump truck	8	1	4	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	34	4	2	1361.86	0.06	0.01
													Subtotal	21	84	209	26	15	41019	2	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	2	2	14	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	5	11	2	1	2322.59	0.09	0.02
Concrete truck	4	4	9	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	11	45	140	15	7	11142.50	0.45	0.09
Dump truck	6	6	9	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	28	111	346	37	17	18385.13	0.74	0.15
Delivery truck	1	1	29	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	20	2	1	6462.65	0.26	0.05
Backhoe/loader	1	8	3	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	4	8	1	1	2911.91	0.12	0.02
Small diesel engines	2	2	52	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	8	10	2	1	1287.58	0.05	0.01
													Subtotal	45	179	534	58	27	42512	2	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Small diesel engines	2	4	15	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	6	1	1	742.83	0.03	0.01
Delivery truck	1	2	19	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	9	27	3	1	8468.30	0.34	0.07
Skid steer loader	2	4	61	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	9	39	93	15	8	20239.73	0.82	0.16
Concrete truck	4	4	6	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	8	30	93	10	4	7428.33	0.30	0.06
Crane	1	8	9	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	3	7	46	8	2	10696.80	0.43	0.09
													Subtotal	22	90	265	37	16	47576	2	0

Construct East Ramp 11.4 acres 495,140 sq ft

Site prep (grading, compacting, drainage, etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	2	8	14	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	58	231	718	80	34	41460.00	1.67	0.33
Backhoe/loader	3	8	124	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	134	471	932	115	97	120358.81	4.86	0.97
Grader	3	8	21	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	59	235	729	81	35	28079.10	1.13	0.23
Small diesel engines	3	8	124	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	22	116	148	26	13	12281.51	0.50	0.10
Dump truck (12 CY)	32	1	124	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	344	1364	4234	450	203	42217.69	1.71	0.34
													Subtotal	616	2417	6760	751	383	244397	10	2

Concrete apron construction

Equipment	Number	Hr/day	# days	Hp	LF	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Skid steer loader	4	4	124	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	35	159	377	63	32	41143.06	1.66	0.33
Concrete truck (9 CY)	24	1	88	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	166	660	2048	218	98	27237.22	1.10	0.22
Dump truck (12 CY)	2	0.5	33	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	35	4	2	5617.68	0.23	0.05
Delivery truck	2	1	29	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	13	41	4	2	6462.65	0.26	0.05
Backhoe/loader	2	8	124	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	89	314	621	77	65	120358.81	4.86	0.97
													Subtotal	297	1158	3123	365	199	200819	8	2

F-35 Beddown Construction Air Emissions

Construct Live Ordnance Loading Area Expansion 167,322 sq ft

Site prep (grading, compacting, drainage, etc.)

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	2	8	5	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	21	83	256	28	12	14807.14	0.60	0.12
Backhoe/loader	3	8	45	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	49	171	338	42	35	43678.60	1.76	0.35
Skid steer loader	2	4	30	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	4	19	46	8	4	9953.97	0.40	0.08
Grader	3	8	8	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	23	89	278	31	13	10696.80	0.43	0.09
Small diesel engines	3	8	45	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	8	42	54	10	5	4457.00	0.18	0.04
Dump truck (12 CY)	32	1	45	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	125	495	1536	163	74	15320.94	0.62	0.12
													Subtotal	229	899	2508	281	143	98914	4	1

Concrete apron construction

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	4	4	45	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	13	58	137	23	12	14930.95	0.60	0.12
Concrete truck (9 CY)	24	1	32	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	60	240	745	79	36	9904.44	0.40	0.08
Dump truck (12 CY)	2	0.5	12	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	4	13	1	1	2042.79	0.08	0.02
Delivery truck	2	1	11	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	1	5	15	2	1	2451.35	0.10	0.02
Small diesel engines	4	6	32	25	0.43	1.7	5	8.5	0.93	0.9	22.29	0.0009	0.00018	31	91	155	17	16	5942.67	0.24	0.05
Backhoe/loader	2	8	45	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	32	114	225	28	24	43678.60	1.76	0.35
													Subtotal	139	512	1290	150	89	78951	3	1

Fuel Cell Hangar 50,250 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	1	4	5	299	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	21	64	7	3	7403.57	0.30	0.06
Grader	1	4	5	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	2	9	29	3	1	3342.75	0.14	0.03
Skid steer loader	2	4	35	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	5	23	53	9	4	11612.96	0.47	0.09
Backhoe/loader	1	6	35	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	9	33	66	8	7	25479.18	1.03	0.21
Small diesel engines	1	4	35	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	5	7	1	1	1733.28	0.07	0.01
Dump truck	8	1	5	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	14	43	5	2	1702.33	0.07	0.01
													Subtotal	26	105	262	33	18	51274	2	0

Foundation (slab)

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Skid steer loader	2	2	17	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	1	5	13	2	1	2820.29	0.11	0.02
Concrete truck	4	4	11	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	14	55	171	18	8	13618.61	0.55	0.11
Dump truck	6	6	11	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	34	136	423	45	20	22470.71	0.91	0.18
Delivery truck	1	1	36	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	8	25	3	1	8022.60	0.32	0.06
Backhoe/loader	1	8	4	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	1	5	10	1	1	3882.54	0.16	0.03
Small diesel engines	2	2	52	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	2	8	10	2	1	1287.58	0.05	0.01
													Subtotal	54	218	652	71	33	52102	2	0

Structure

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Small diesel engines	2	4	19	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	22.29	0.0009	0.00018	1	6	8	1	1	940.92	0.04	0.01
Delivery truck	1	2	24	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	3	11	34	4	2	10696.80	0.43	0.09
Skid steer loader	2	4	76	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	11	49	116	19	10	25216.72	1.02	0.20
Concrete truck	4	4	7	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	9	35	109	12	5	8666.39	0.35	0.07
Crane	1	8	11	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	3	9	57	9	3	13073.87	0.53	0.11
													Subtotal	27	109	322	45	20	58595	2	0

Construct Parking Areas 96,486 sq ft

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Grader	1	4	7	135	0.58	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	3	13	41	4	2	4679.85	0.19	0.04
Roller	2	4	7	30	0.59	1.8	5	6.9	1.00	0.8	22.29	0.0009	0.00018	4	11	15	2	2	1039.97	0.04	0.01
Paver	1	8	7	107	0.59	0.68	2.7	8.38	0.93	0.402	22.29	0.0009	0.00018	5	21	65	7	3	7418.43	0.30	0.06
Concrete truck	4	3	16	250	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	15	60	186	20	9	14856.67	0.60	0.12
Delivery truck	1	2	16	180	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	2	7	22	2	1	7131.20	0.29	0.06
Small diesel engines	4	6	30	25	0.43	0.7628	4.1127	5.2298	0.93	0.9	22.29	0.0009	0.00018	13	70	89	16	15	5571.25	0.23	0.05
													Subtotal	42	182	419	52	32	40697	2	0

10,000 ft^3

Average density of HMA	145	lb/ft^3
CARB EF for HMA	0.04	lb/ton
VOC emissions from HMA paving	29	lb

Pavement
Marking 900 LF
4" Solid Line= 215 ft/gal VOC content of paint = 1.3 lb/gal

VOC
lb
5

2300 tons of debris
177 truckloads

Demolish Bldgs 441, 413 and 415 (multi-story) 65,722 SF

Equipment	Number	Hr/day	# days	Hp	LF	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Dozer	3	8	42	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	117	412	814	110	85	37438.80	1.51	0.30
Skid steer loader	2	8	42	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	12	54	128	21	11	27871.11	1.13	0.23
Crane	1	8	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	2	6	41	7	2	9508.27	0.38	0.08
													Subtotal	131	472	983	138	98	74,818	3	1

Equipment	Number	Hr/day	# days	Hp		VOC	CO	NOx	SO2	PM	CO2	CH4	N2O	VOC	CO	NOx	SO2	PM	CO2	CH4	N2O
						g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/gal	lb/gal	lb/gal	lb	lb	lb	lb	lb	lb	lb	lb
Backhoe/loader	2	8	50	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	36	127	250	31	26	48531.78	1.96	0.39
Skid steer loader	2	8	50	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	14	64	152	25	13	33179.89	1.34	0.27
Dump truck	8	2	50	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	69	275	854	91	41	34046.53	1.38	0.28
													Subtotal	119	466	1,256	147	80	115,758	5	1

F-35 Beddown Construction Air Emissions

Truck transport of debris to disposal site

Equipment	*Number*	*# days*	*Trip Length*	ROG lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	ROG lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
Trucks	8	22	30	0.00070	0.00206	0.01	0.00003	0.00027	3.11625	4	11	45	0	1	16,454

Demolish Bldgs 258 and 25(20,809 SF 728 tons of debris 56 truckloads

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Dozer	1	8	20	90	0.59	0.99	3.49	6.9	0.93	0.722	22.29	0.0009	0.00018	19	65	129	17	14	17828.00	0.72	0.14
Skid steer loader	2	8	20	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	6	26	61	10	5	13271.96	0.54	0.11
Crane	1	8	1	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	22.29	0.0009	0.00018	0	1	5	1	0	1188.53	0.05	0.01
													Subtotal	25	92	195	28	19	32,288	1	0

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM g/hp-hr	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	VOC lb	CO lb	NOx lb	SO2 lb	PM lb	CO2 lb	CH4 lb	N2O lb
Backhoe/loader	2	14	11	98	0.21	0.99	3.49	6.9	0.85	0.722	22.29	0.0009	0.00018	14	49	96	12	10	18684.73	0.75	0.15
Skid steer loader	2	14	11	67	0.23	0.5213	2.3655	5.5988	0.93	0.473	22.29	0.0009	0.00018	5	25	59	10	5	12774.26	0.52	0.10
Dump truck	8	4	11	275	0.21	0.68	2.7	8.38	0.89	0.402	22.29	0.0009	0.00018	30	121	376	40	18	14980.47	0.61	0.12
													Subtotal	50	195	531	61	33	46,439	2	0

Truck transport of debris to disposal site

Equipment	*Number*	*# days*	*Trip Length*	ROG lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	ROG lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
Trucks	8	7	30	0.00070	0.00206	0.01	0.00003	0.00027	3.11625	1	3	14	0	0	5,235

PM_{10} tons/acre/mo	acres	days of disturbance	PM_{10} Total	$PM_{2.5}/PM_{10}$ Ratio	$PM_{2.5}$ Total
0.42	1.5	285	6.0	0.1	0.6

Construction Worker POVs

	Number	# days	Trip Length	VOC lb/mi	CO lb/mi	NOx lb/mi	SOx lb/mi	PM lb/mi	CO2 lb/mi	VOC lb	CO lb	NOx lb	SOx lb	PM lb	CO2 lb
2014	500	250	4	0.001402116	0.020629409	0.00103505	1.8078E-05	5.48942E-05	0.9337728	701.1	10314.7	517.5	9.0	27.4	466886.4
2015	500	250	4	0.001318371	0.019996032	0.00095461	1.8078E-05	5.46737E-05	0.9336626	659.2	9998.0	477.3	9.0	27.3	466831.3
2016	500	250	4	0.001245591	0.019422399	0.00095459	1.8078E-05	5.46737E-05	0.933883	622.8	9711.2	477.3	9.0	27.3	466941.5

	VOC	CO	NOx	SO2	PM_{10}	$PM_{2.5}$	CO2	CH4	N2O	Metric Tons/yr CO_2e
2014 Annual Total in Tons	0.71	6.53	3.99	0.44	2.22	0.44	508.60	0.01	0.00	462
2015 Annual Total in Tons	0.69	6.37	3.97	0.44	2.22	0.44	508.57	0.01	0.00	462
2016 Annual Total in Tons	0.67	6.23	3.97	0.44	2.22	0.44	508.62	0.01	0.00	462

F-35 Beddown - Aircraft Operation Emissions*

	Tons/Year						Metric Tons/Year
	VOCs	CO	NOx	SOx	PM_{10}	[1]$PM_{2.5}$	CO_{2e}
Four F-35 Aircraft:							
2012 - 2014							
Aircraft	0.67	8.00	18.67	0.67	5.33	5.17	12,693
AGE	0.34	4.05	2.06	0.16	0.11	0.10	698
Total	**1.01**	**12.05**	**20.73**	**0.83**	**5.44**	**5.28**	**13,390**
Eleven F-35 Aircraft:							
2015 - 2016							
Aircraft	1.83	22.92	50.42	2.75	15.58	15.12	34,905
AGE	0.94	11.15	5.67	0.44	0.29	0.28	1,918
Total	**2.77**	**34.06**	**56.08**	**3.19**	**15.88**	**15.40**	**36,824**
Thirteen F-35 Aircraft:							
2017							
Aircraft	2.17	54.17	119.17	6.50	36.83	35.73	41,252
AGE	2.21	26.35	13.39	1.04	0.69	0.67	2,267
Total	**4.38**	**80.51**	**132.56**	**7.54**	**37.53**	**36.40**	**43,519**
Twenty-eight F-35 Aircraft:							
2018							
Aircraft	4.67	58.33	128.33	7.00	39.67	38.48	88,850
AGE	2.38	28.37	14.42	1.12	0.75	0.72	4,883
Total	**7.05**	**86.71**	**142.75**	**8.12**	**40.41**	**39.20**	**93,733**
Thirty-two F-35 Aircraft:							
2019							
Aircraft	5.33	66.67	146.67	7.11	44.44	43.11	101,543
AGE	2.72	32.43	16.48	1.28	0.85	0.83	5,581
Total	**8.05**	**99.09**	**163.15**	**8.39**	**45.30**	**43.94**	**107,123**
Thirty-six F-35 Aircraft:							
2020 -							
Aircraft	6.00	75.00	165.00	8.00	50.00	48.5	114,235
AGE	3.06	36.48	18.54	1.44	0.96	0.93	6,278
Total	**9.06**	**111.48**	**183.54**	**9.44**	**50.96**	**49.43**	**120,514**

*Emissions in tons from AGE per year were calculated using the fighter aircraft defaults in the Air Force Conformity Applicability Model (ACAM) 4.3.3 (Air Force 2005). Specific AGE have not been created for this new aircraft, nor have the maintenance and surface repair needs been identified therefore, this represents the best available data available at this time for calculating AGE emissions as they are associated with the F-35. Emissions for the F-35 aircraft F-135 engine were calculated using data provided by the Joint Strike Force Program Office (October 2007) in charge of design and development of the F-35 aircraft. Because the aircraft is still in the research stage and no operational aircraft and/or engines have been built, the emissions are based on the one research engine in operation at the time of this EIS analysis. If applicable, new air emissions calculations will be evaluated once the operating engines are brought into production and being used.

[1] PM2.5 calculated as 97% of PM10 emissions, in accordance with EPA OTAQ/OAQPS guidance, *Commercial Marine, Airports, and Trains Approach* , EPA Docket #OAR-2003-0053-1696.

F135 Engine Assumptions

Please note that all data is as complete as possible as of the publication of this EIS. The Air Force recognizes that these data reflect the test engine; however as soon as new emissions data are available, the Air Force will analyze them to determine whether they will impact conformity. If the findings substantially change the conclusions reached in this document, new information will be supplemented and made available to the public.

F-135 Aircraft Engine Emissions Assumptions

POW_SET	*POWER_AC_MODE*	*POW_SET_NO*	*POW_SET_TEST*	*POW_SET_TEST_NO*	*POW_SET_TEST_PERC*	*WORD_POW_SET*	*NOX_LBHR*	*SOX_LBHR* [3]	*CO_LBHR*	*VOC_LBHR*	*PM_LBHR*
AB	Takeoff	2	AB	5	5	AB-5	588.95	71.92	1286.59	14.38	91.9
AP	Approach	4	AP	2	45	Approach	68.6	5.09	6.5	1.23	28.91
ID	Taxi/Idle-out Taxi/Idle-in	1 5	ID	1	20	Idle	8.81	1.72	36.77	2.8	13.57
IN	*	3	IN	3	15	Intermediate 70%	264.66	11.58	8.66	1.84	46.59
MI	Climbout	3	MI	4	15	Intermediate	1567.58	21.24	11.31	3.26	59.47

Sources :

[1] Time-in-mode and F135 fuel flow rates for conventional operations are from (2006 FFR for Conformity.xls) e-mailed from Jean Hawkins (JSF Program staff) to Flint Webb and Jon Fetter-Deggas, 21 April 2006.

[2] F-135 NO_x, CO, and HC (i.e., VOCs) emissions equations are curve fit from Graves 2002. "JSF Engine Emissions", PowerPoint presentation made to the JSF Program Office, 4 November 2002. PM EIs from AESO 2000-04. Aircraft Environmental Support Office (AESO). "Estimated Particulate Emission Indexes for the JSF F119 Variant Engine, Draft," AESO Memo Report 2000-04, Rev. A, No date file transmitted via e-mail from Lyn Coffer via Jean Hawkins to Flint Webb dated August 27, 2002.

[3] SO_2 emissions assumes 0.045 percent sulfur content of the fuel by weight based on O'Brien, Robert J. and Wade, Mark D., "Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations", published by the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis (AFIERA), Risk Analysis Directorate, Environmental Analysis Division, IERA-RS-BR-SR-2001-0010, January 2002 which reports the data to be "Based on average values from the report titled "Survey of Jet Fuels Aircraft Support Center, 1990-1996."

[4] APU NO_x, CO, and HC emissions from Bobalik, John M., "IPP Emissions", e-mail to Flint Webb Via Jim McCartney (JPO PTMS POC) and Jean Hawkins (JSF Environmental, Safety and Health Team Lead), September 9, 2002. PM emissions from Aircraft Environmental Support Office (AESO). "Aircraft Emission Estimates: F/A-18 Landing and Takeoff Cycle and In-Frame, Maintenance Testing Using JP-5", AESO Memorandum Report No. 9815, Revision E, November 2002.

[5] CO, HC, and NO_x emission indices above 50,000 lb/hr are taken equal to those given for the F119-PW-100 at power setting AB-5 from Wade, Mark D. (AFIERA/RSEQ), (F119-PW-100.xls) spreadsheet e-mailed to Flint Webb via Capt. Paul J. Benarchzyk (ASC/FBM) and Lt. Chad F. Schroeder (ASC/FBJ), January 10, 2002. Specific indices are proprietary information and not available for public review.

1 F-35 = 480 LTOs

Surrogate AGE Emissions/aircraft		HP	Hr/LTO	FFR gal/hr	% Load	CO2 lb/gal	CH4 lb/gal	N2O lb/gal	Emissions in lb/yr CO2	CH4	N2O	CO2e
MC-1A	Compressor	18.4	0.33	1.09	0.5	21.45	0.0010	0.0002	3703	0	0	3,717
MC-11	Compressor	18.4	2	1.09	0.5	21.45	0.0010	0.0002	22445	1	0	22,530
Diesel AC Tug Narrow	AC Tug	118	0.1	6.29	0.5	21.45	0.0056	0.0011	6476	2	0	6,617
MJ-40	Bomblift	67	1	3.3	0.5	21.45	0.0029	0.0006	33977	5	1	34,363
Diesel Baggage Tug		86	1.3	4.45	0.5	21.45	0.0040	0.0008	59562	11	2	60,476
Diesel Cargo Loader		73	1.5	4.45	0.5	21.45	0.0040	0.0008	68726	13	3	69,780
Diesel De-Icer		165	0.15	6.47	0.5	21.45	0.0058	0.0012	9992	3	1	10,215
Diesel Fuel Truck		180	0.6	4.45	0.5	21.45	0.0040	0.0008	27490	5	1	27,912
A/AM32A-86	Generator	148	0.33	6.47	0.5	21.45	0.0058	0.0012	21983	6	1	22,473
MJ-1-1	Hydraulic Test Stand	97	0.5	2.52	0.5	21.45	0.0022	0.0004	12973	1	0	13,086
H-1	Heater	6.5	0.5	0.39	0.5	21.45	0.0003	0.0001	2008	0	0	2,010
MJ-T/TTU-228	Hydraulic Test Stand	125	0.5	4.92	0.5	21.45	0.0044	0.0009	25328	5	1	25,758
NF-2	Light Cart	22.4	4	0.62	0.5	21.45	0.0006	0.0001	25534	1	0	25,589
AM32A-60A	Start Cart	180	0.33	8.57	0.5	21.45	0.0076	0.0015	29118	10	2	29,978
AM32A-95	Start Cart	155	0.33	8.57	0.5	21.45	0.0076	0.0015	29118	10	2	29,978
									189.2	**0.04**	**0.01**	**174** (metric tons)

4 Aircraft	698
11 Aircraft	1,918
13 Aircraft	2,267
28 Aircraft	4,883
32 Aircraft	5,581
36 Aircraft	6,278

[1]GHG Emissions from one F-35A LTO Cycle

		Emissions per Operation, lbs/op			Total Emissions Tons/Year			Total Emissions Metric Tons/Year
Type of Operation	Total Number of Operations	[2]CO_2	[3]CH_4	[3]N_2O	CO_2	CH_4	N_2O	CO_2e
Idle/Taxi Out	1	4,134	0.1712	0.0337	2.0672	0.00009	0.00002	1.88
Military Take Off	1	3,569	0.1478	0.0291	1.7847	0.00007	0.00001	1.62
Straight In Arrival	1	1070	0.0443	0.0087	0.5352	0.00002	0.00000	0.49
Tower Pattern	1	665	0.0275	0.0054	0.3325	0.00001	0.00000	0.30
Idle/Taxi In	1	5,086	0.2106	0.0415	2.5430	0.00011	0.00002	2.31
					7.26	**0.00030**	**0.00006**	**6.61**

[1] LTO cycle includes operational types identified in table; profiles from Hill AFB.

[2]Carbon dioxide emissions are based on Table C-1 of the Mandatory Greenhouse Gas Reporting Rule.

[3]Nitrous Oxide and Methane emissions are based on Table C-2 of the Mandatory Greenhouse Gas Reporting Rule.

Each aircraft flies 480 LTO cycles per year:

	CO_2e
4 Aircraft	12,693
11 Aircraft	34,905
13 Aircraft	41,252
28 Aircraft	88,850
32 Aircraft	101,543
36 Aircraft	114,235

APPENDIX E
STATE AND FEDERAL LISTED SPECIES POTENTIALLY FOUND WITHIN THE NEVADA TEST AND TRAINING RANGE (NTTR)

APPENDIX E

STATE AND FEDERAL LISTED SPECIES POTENTIALLY FOUND WITHIN THE NEVADA TEST AND TRAINING RANGE (NTTR)

The following provides a list of all state and federally listed plant species potentially found within the NTTR (Lincoln and Nye Counties). These lists include the common and scientific names, state and federal rankings, and brief description of potential habitat where the species in commonly found.

Table E-1 Special Status Plant Species Known or Likely to Occur on NTTR	
Common Name *(Scientific Name)*	***Regulatory Status***
Amphibians	
Columbia spotted frog *(Rana luteiventris)*	C
Birds	
Greater Sage Grouse *(Centrocercus urophasianus)*	C
Southwester willow flycatcher *(Empidonax traillii extimus)*	E*
Yellow-billed cuckoo *(Coccyzus americanus)*	C
Fishes	
Ash Meadows Amargosa pupfish *(Cyprindodon nevadensis mionectes*	E*
Ash Meadows speckled dace *(Rhinichthys osculus nevadensis)*	E*
Big Spring spinedance *(Lepidomeda mollispinis pratensis)*	T*
Devil's Hole pupfish *(Cyprindodon diabolis)*	E*
Hiko White River springfish *(Crenichthys baileyi grandis)*	E*
Lahontan cutthroat trout *(Oncorhynchus clarkia henshawi)*	T*
Pahranagat roundtail chub *(Gila robusta jordani)*	E*
Railroad Valley springfish *(Crenichthys nevadae)*	T*
Warm Springs pupfish *(Cyprinodon nevadensis pectoralis)*	E*
White River spinedace *(Lepidomeda albivallis)*	E*
White River springfish *(Crenichthys baileyi baileyi)*	E*
Invertebrates	
Ash Meadows naucorid *(Ambrysus amargosus)*	T*

Table E-1 Special Status Plant Species Known or Likely to Occur on NTTR	
Common Name ***(Scientific Name)***	***Regulatory Status***
Plants	
Amargosa niterwort *(Nitrophila mohavensis)*	E*
Ash Meadows blazing star *(Mentzelia leucophylla)*	T*
Ash Meadows gumplant *(Grindelia fraxinopratensis)*	T*
Ash Meadows ivesia (mousetail) *(Ivesia eremica)*	T*
Ash Meadows milkvetch *(Astragalus phoenix)*	T*
Ash Meadows sunray *(Enceliopsis nudicaulis* var. *corrugate)*	T*
Las Vegas Buckwheat *(Eriogonum corymbosum* var. *nilesii)*	C
Spring-loving centaury *(Centaurium namophilum)*	T*
Ute Lady's tresses *(Spiranthes diluvialis)*	T*
Reptiles	
Desert tortoise *(Gopherus agassizii)*	T*

Source: USFWS 2011.

C=State species of concern
E= Endangered
T=Threatened
*Also Federally listed

APPENDIX F
FINAL GENERAL CONFORMITY DETERMINATION

FINAL GENERAL CONFORMITY DETERMINATION
FOR THE PROPOSED
F-35 BEDDOWN AT NELLIS AFB, NV

Prepared for:

Headquarters, Air Combat Command
Langley AFB, VA

ACRONYMS AND ABBREVIATIONS

ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
AFB	Air Force Base
AGE	Aerospace Ground Equipment
BAQ	Bureau of Air Quality
BTS	Bureau of Transportation Statistics
CAAA	Clean Air Act Amendments
CARB	California Air Resources Board
CCHD	Clark County Health Department
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DAQEM	Department of Air Quality and Environmental Management
EF	Emission Factor
°F	Degrees Fahrenheit
FDE	Force Development Evaluation
FY	Fiscal Year
hp	Horsepower
LF	Load Factor
$\mu g/m^3$	micrograms per cubic meter
MRI	Midwest Research Institute
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
O_3	Ozone
Pb	Lead
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PM_{10}	Particulate Matter less than 10 microns
POV	Privately-Owned Vehicles
ppm	Parts per million
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile Organic Compounds
WRAP	Western Regional Air Partnership
WS	Weapons School

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EXECUTIVE SUMMARY

Proposed Action

The Air Force proposes to base (beddown) 36 F-35 fighter aircraft at Nellis Air Force Base (AFB), Nevada. These aircraft would be assigned to the Force Development Evaluation (FDE) program and Weapons School (WS) at Nellis AFB. As of March 2011, the Air Force anticipates that the first four F-35s would arrive for FDE program beddown in 2012; in 2015 F-35s would begin to arrive to support the WS beddown. These aircraft would remain at Nellis AFB into the foreseeable future since the requirements for the FDE program and WS remain as long as the Air Force retains the F-35. These aircraft would remain at Nellis AFB into the foreseeable future since the requirements for the FDE program and WS remain as long as the Air Force retains the F-35. To support this beddown, 412 personnel would be added to the base from 2012 to 2020, new facilities would be built, and existing buildings and infrastructure altered, renovated, or demolished. These construction-related activities would disturb about 36 acres of land between 2011 and 2016.

Differences Between the Draft and Final Conformity Determination

While this Final Determination is, in large part, the same as the Draft, it reflects consideration of comments received during the public comment period and includes factual corrections, improvements, and/or modifications to the analyses presented in the Draft. Modifications include updated proposed construction projects and start dates, as well as a revised timeframe for the F-35 beddown. Also modified in the Final Determination are air quality evaluations. Emissions were updated to reflect changes in proposed construction projects and their start dates as well as the revised F-35 beddown phasing. None of the modifications resulted in substantive changes to the proposed action and the conclusions presented in this Final Determination remain consistent with those presented in the Draft.

Conformity Background

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The Clean Air Act and subsequent amendments (CAAA) established National Ambient Air Quality Standards (NAAQS) for six “criteria” pollutants: 1) ozone (O_3), 2) carbon monoxide (CO), 3) nitrogen dioxide (NO_2), 4) sulfur dioxide (SO_2), 5) particulate matter (PM) less than 10 and 2.5 micrometers (PM_{10} and $PM_{2.5}$), and 6) lead (Pb).

The U.S. Environmental Protection Agency (USEPA) has classified a portion of the Las Vegas Valley area as in nonattainment for subpart 1 (basic) for 8-hour ozone and its precursor pollutants, nitrogen oxide (NO_x) and volatile organic compounds (VOCs), as well as in maintenance status for PM_{10} and CO. According to the CAAA general conformity rule, a federal agency (in this case the Air Force) must assess

whether their proposed action would contribute to the further degradation of air quality or prevent attainment of air quality standards in areas that are in nonattainment. Nellis AFB proposes to implement a major federal action that would contribute to regional air emissions within the Las Vegas Valley, an area that is in nonattainment or maintenance status for three criteria pollutants.

The Air Force, therefore, conducted this review to document whether the Nellis AFB proposed action to beddown 36 F-35 aircraft meets the conformity rule. There are two main components to this documentation of conformity: 1) an applicability analysis to determine whether a conformity determination is required and, if it is, 2) a conformity determination to evaluate whether the action conforms to the State Implementation Plans (SIPs).

Under the 2003 U.S. Air Force Conformity Guide, proposed action emissions must be below *de minimis* levels for nonattainment pollutants to be exempt from a formal conformity determination. Proposed actions that exceed these thresholds in any given year must undergo a detailed analysis and a formal conformity determination is required.

Existing Conditions

Air emissions at Nellis AFB are primarily generated from mobile sources (i.e., vehicles and aircraft) and equipment found in maintenance shops, boilers, and paint booths. Nellis AFB contributes less than 1 percent for any of the NAAQS criteria pollutants; thus, all regional contributions by the base remain well below the 10 percent significance threshold.

Applicability Analysis Approach, Results, and Conclusion

Approach. In accordance with the CAAA and the 2003 U.S. Air Force Air Conformity Guide, the incremental increase in emissions above existing conditions was considered and includes reasonable foreseeable direct and indirect emissions. Emissions data were based on the expected number, type, and duration of aircraft operations within the airspace at Nellis AFB and include construction and demolition activities, workers commuting, construction equipment transportation, as well as Air Force personnel commuting. Total emissions were calculated based on current best estimates of construction timeframes and aircraft and personnel arrivals at the base.

Results. Following calculations for emissions from 2012 through 2020, it was determined that Fiscal Year 2020 (FY20) would represent the maximum amount of emissions, in any given year, generated under the proposed action by aircraft, aircraft ground equipment, and commuting personnel. These totals are presented in the table below and then compared to *de minimis* thresholds; the projected percent contribution to the regional air quality has also been calculated.

Maximum (FY20) Projected Action Emissions Compared to *De Minimis* Thresholds and 2005 Regional Emissions (Tons)				
	VOCs	***NO_x***	***CO***	***PM_{10}***
Clark County 2005 Emissions	43,980	73,360	306,425	46,717
Proposed Action FY20 Emissions	9.87	184.18	127.64	51.01
De minimis Threshold	100	100	100	70
Percent Regional Contribution	0.02	0.25	0.04	0.11

Regionally, emissions would represent less than 1 percent of the regional contribution for any of the pollutants of concern in the year anticipated to incur the most pollutant emissions—FY20.

Conclusion

Based on this evaluation of the emissions associated with implementation of this proposed action (both construction and F-35 operations), the estimated emissions rates of NO_x and CO would exceed the 100 tons per year applicability threshold in Clark County, Nevada. In FY20, emissions of NO_x and CO would exceed the thresholds by 84.18 and 27.64 tons per year, respectively. As shown in the table above, these project emissions would represent less than 10 percent of the area emissions of these nonattainment pollutants, and would, therefore, not be subject to general conformity requirements based upon regional significance.

General Conformity Determination

While the Las Valley may have exceeded federal CO air quality standards on a seasonal basis, the USEPA determined in 2005 that it was in attainment. Therefore, in 2008 the County submitted to USEPA a CO Maintenance Plan and requested a formal redesignation (CC DAQEM 2008a); in September 2010 USEPA approved the Plan and request for redesignation (75 *Federal Register* [FR] 59090, USEPA 2010a). In terms of PM_{10} status, USEPA determined in August 2010 that the Las Vegas Valley had reached attainment of this criteria pollutant by the applicable date of December 31, 2006 (75 FR 45485, USEPA 2010b). This determination was not a redesignation because the USEPA has not approved an applicable PM_{10} Maintenance Plan; therefore, the Valley remains in serious nonattainment until Nevada meets the CAA requirements for redesignation of the Valley to attainment (75 FR 45485, USEPA 2010b). For ozone, in June 2007 the USEPA determined that areas classified as in nonattainment under Subpart 1 (which applies to the Las Vegas Valley) would not be required to demonstrate attainment in 2007 (CC DAQEM 2008b). This action obligated Clark County to develop an early progress plan that contains motor vehicle emission budgets to address the ozone standards in advance of a complete attainment demonstration. Progress is demonstrated if projected emissions by June 15, 2009 attainment date (2008 ozone season) are less than emissions in the 2002 base year (CC DAQEM 2008). Clark County (as a revision to the state's ozone SIP) submitted their Ozone Early Progress Plan to USEPA in July 2008 and in May 2009 the USEPA found that the emissions budgets contained therein were adequate

to demonstrate progress towards attainment (74 FR 22738, USEPA 2009). In March 2011, Clark County submitted to USEPA the *Ozone Redesignation Request and Maintenance Plan* (CC DAQEM 2011). Upon USEPA approval, emissions goals contained therein will be regulated by the County.

According to the Plan, F-35 and AGE specific emissions have been accounted for in their 2015 and 2022 ozone maintenance goals (CC DAQEM 2011). In the Plan's Section 4.0, Tables 4-3 and 4-4, all F-35 operational and AGE emissions are accounted for in terms of CO, NO_x, and VOCs (precursor pollutants of ozone).

Finding of Conformity

The Air Force has reviewed and evaluated the documentation and has determined that conformity may be determined through compliance with Title 40 Code of Federal Regulations (CFR) Part 93.158 (a) (5) (i)(B) and Title 40 CFR Part 93.158(a)(4)(ii).

Public and Agency Involvement

The Draft General Conformity Determination was made available for public and agency review for 30 days. A notice of Availability was published in the *Las Vegas Review Journal* on December 10, 2009 requesting any comments on the draft document be submitted no later than January 8, 2010. The Air Force received three comment letters via U.S. Mail and one set of comments via email. Attachment A provides copies of the comments received and Air Force responses to comments, where applicable.

1.0 INTRODUCTION

According to the Clean Air Act and subsequent amendments (CAAA), any federal agency (in this case the Air Force) must assess whether their proposed action would contribute to the further degradation of air quality or prevent attainment of air quality standards. The Air Force proposes to implement a major federal action that would contribute to regional air emissions within the Las Vegas Valley (Figure 1), an area that is in nonattainment for three criteria pollutants.

1.1 Air Quality and Criteria Air Pollutants

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The CAAA established National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants: 1) ozone (O_3), 2) carbon monoxide (CO), 3) nitrogen dioxide (NO_2), 4) sulfur dioxide (SO_2), 5) particulate matter (PM) less than 10 and 2.5 micrometers (PM_{10} and $PM_{2.5}$), and 6) lead (Pb). These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The Nevada Division of Environmental Protection, Bureau of Air Quality has adopted the NAAQS, with the following exceptions and additions: 1) the state annual SO_2 standard is more stringent than the national standard, 2) added an 8-hour CO standard specific to elevations greater than 5,000 feet above mean sea level, and 3) added standards for visibility impairment and 1-hour hydrogen sulfide concentrations.

Two types of NAAQS have been established for these criteria air pollutants: primary and secondary standards (or concentrations). Primary ambient air quality standards are designed to protect public health with an adequate margin of safety. Secondary standards are designed to protect public welfare-related values including property, materials, and plant and animal life. The maximum primary and secondary standards of criteria pollutants are listed in Table 1.

Criteria pollutants affecting air quality in a given region can be characterized as being emitted from either stationary or mobile sources. Examples of stationary sources include smokestacks from boilers, engine testing, and chemical processing operations such as paint booths. Mobile sources of emissions include those from aircraft, cars, trucks, trains, and ships. Air quality within a region is a function of the stationary and mobile sources, amount of pollutants emitted, size and topography of the air basin, and prevailing meteorological conditions.

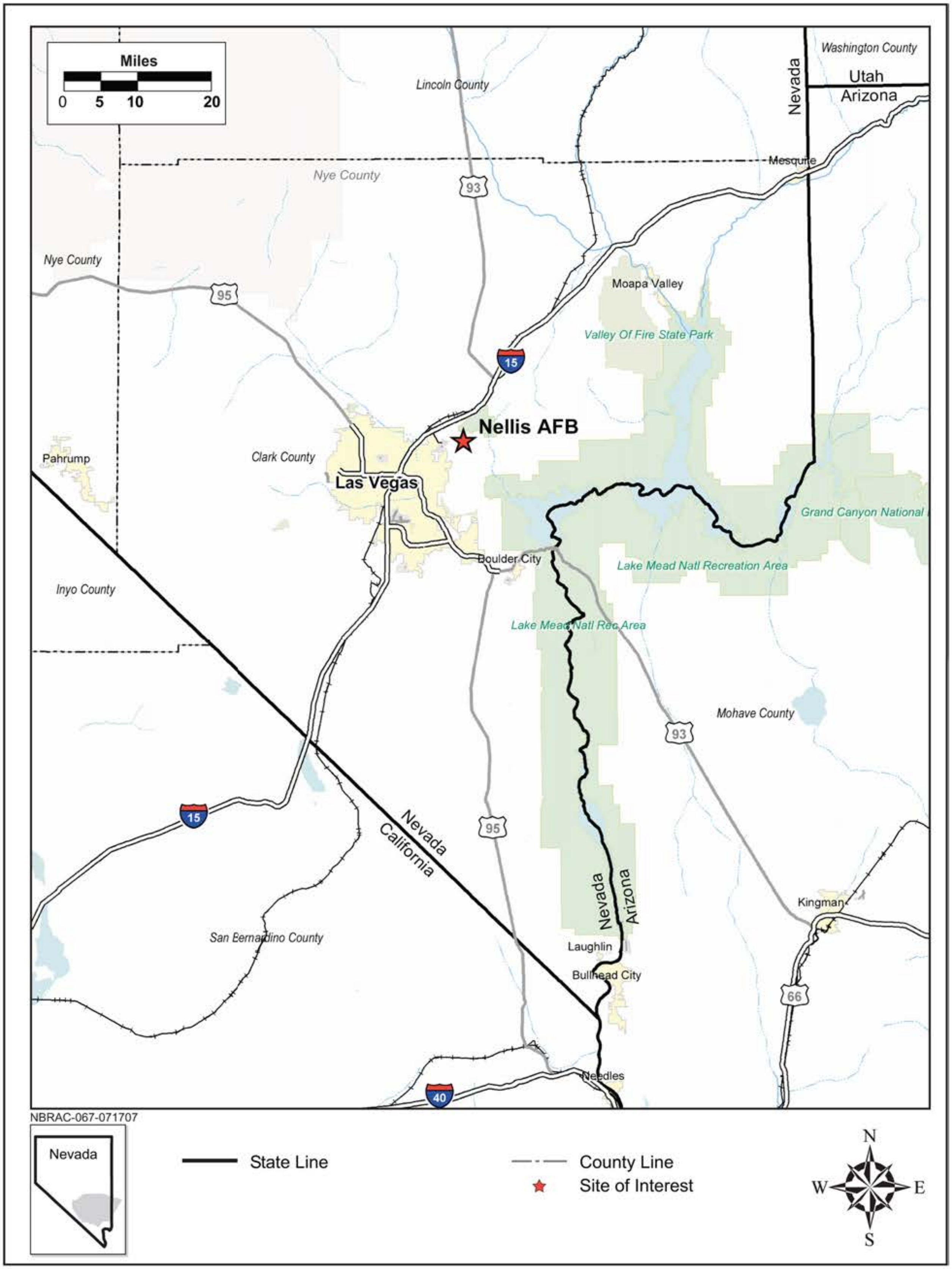

Figure 1 Nellis AFB and Clark County, Nevada

Table 1. National Ambient Air Quality Standards*			
	AVERAGING TIME	*PRIMARY*	*SECONDARY*
Ozone (O_3)[a]	8 Hours	0.075 ppm[a]	Same as Primary
	8 Hours	0.08 ppm[b]	Same as Primary
	1 Hour	0.12 ppm[c]	
Carbon Monoxide (CO)	8 Hours	9 ppm	None
	1 Hour	35 ppm	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	53 ppb[d]	Same as Primary
	1 Hour	100 ppb[e]	None
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	0.03 ppm	3 hour/0.5 ppm
	24 Hours	0.14 ppm	
	1 Hour	75 ppb[f]	None
Particulate Matter (PM_{10})[g]	24 Hours	150 μg/m^3	Same as Primary
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean[h]	15 μg/m^3	Same as Primary
	24 Hours[i]	35 μg/m^3	---
Lead (Pb)	Quarterly Arithmetic Mean	1.5 μg/m^3	Same as Primary

Source: USEPA 2010.

Notes: *ppm = parts per million by volume, μg/m^3 = micrograms per cubic meter.

[a]To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008).

[b]To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. USEPA is in the process of reconsidering these standards (set in March 2008).

[c]USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.

[d]The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[e]To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

[f]Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

[g]Not to be exceeded more than once per year on average over 3 years.

[h]To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.

[i]To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

Negative impacts to human health from these criteria pollutants can include, but are not limited to the following:

- at low concentrations, CO can cause fatigue in healthy people and chest pain in people with heart disease; at higher concentrations, vision and coordination can be impaired and create headaches, dizziness, confusion, and nausea;
- O_3 (or smog) in the lower atmosphere can damage lung tissue and affect respiratory function; volatile organic compounds (VOCs) and nitrogen oxide (NO_x) are precursors of O_3;

- VOCs contribute to acid rain formation, deteriorate water quality, and introduce particulates into the air obscuring the visual landscape; and
- exposure to particulates can damage both lungs and the heart; the NAAQS regulate two sizes—fine particles of 2.5 micrometers or smaller and typically found in smoke and haze, and larger particles, such as dust, at 10 micrometers in diameter (USEPA 2007).

1.2 Air Quality Designations

The United States Environmental Protection Agency (USEPA) designates an area as in attainment when it complies with the NAAQS. Areas that violate these ambient air quality standards are designated as nonattainment areas. Areas that have improved air quality from nonattainment to attainment are designated as attainment/maintenance areas. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes. Varying levels of nonattainment have been established for O_3, CO, and PM_{10} to indicate the severity of the air quality problem (i.e., the classifications run from moderate to serious for CO and PM_{10} and from marginal to extreme for O_3).

1.2.1 Federal Requirements

The CAAA requires that each state develop a State Implementation Plan (SIP). A SIP provides for the implementation, maintenance, and enforcement of the NAAQS; defines emission limitations; and identifies control measures to attain and maintain the NAAQS. Nellis AFB is located within the Las Vegas Valley of Clark County which is currently in nonattainment or maintenance status for three criteria pollutants: CO, PM_{10}, and 8-hour ozone (the 1997 standard and includes its precursors NO_x and VOCs).

The Clean Air Act Section 176(c) (General Conformity Rule) is applicable to the proposed action at Nellis AFB because Clark County is in nonattainment for three criteria pollutants. The intent of this conformity rule is to ensure that federal actions do not adversely affect the timely attainment of air quality standards in areas of nonattainment or maintenance. The Air Force, therefore, is conducting this analysis to document whether the proposed action to beddown 36 F-35 aircraft at Nellis AFB would adversely impact regional air quality. There are two main components to this documentation: 1) an applicability analysis to determine whether a conformity determination is required and, if it is, 2) a conformity determination to evaluate whether the action conforms to the applicable SIPs and/or Maintenance Plans (Air Force 2003).

1.2.2 State Requirements

As indicated above, the CAAA requires each state to develop, adopt, and implement a SIP to achieve, maintain, and enforce federal air quality standards throughout the state. SIPs are developed on a

pollutant-by-pollutant basis whenever one or more air quality standards are violated. Nevada Division of Environmental Protection is responsible for the preservation, protection, and improvement of the State's air resources. In 2001, the Governor of Nevada assigned authority for air quality matters in Clark County to the Clark County Board of Commissioners. In July 2001, the Clark County Commission created the Clark County DAQEM as the governing agency for air quality planning and regulatory programs. Further discussion of specific requirements, developed by the State of Nevada to address ambient air quality in Clark County, is found in Section 3.2.

The Clark County rules to which the Air Force would rely upon to reduce construction-related PM and VOC emissions include Clark County Air Pollution Regulations Section 94 - *Permitting and Dust Control for Construction Activities and Section 60.4 - Cutback Asphalts*.

1.3 General Conformity Determination Process

The General Conformity Rule consists of three major parts: applicability, analysis, and procedure. These three parts are described in the following sections.

1.3.1 Applicability

Nonattainment and Maintenance Areas

The General Conformity Rule applies to federal actions occurring in geographic regions designated as nonattainment for criteria pollutants or areas designated as maintenance areas. A nonattainment area consists of a region that fails to meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant (refer to Table 1). A maintenance area represents a redesignated nonattainment area that has achieved attainment of the national primary ambient air quality standard. As was previously identified, Nellis AFB is located in the Las Vegas Valley, an area of nonattainment for criteria pollutants.

De Minimis Emissions Levels

The General Conformity Rule established threshold (or *de minimis*) levels of emissions to focus conformity requirements on those federal actions with the potential to produce significant air quality impacts. With the exception of lead, the *de minimis* levels are based on the CAAA's major stationary source definitions for the criteria pollutants (and precursor criteria pollutants) and vary by the severity of the nonattainment area. The USEPA's implementing regulation requires a conformity applicability analysis for nonattainment or maintenance area criteria pollutants to identify whether the annual total of direct and indirect emissions equals or exceeds the annual *de minimis* levels. Tables 2 and 3 list the *de minimis* levels by criteria pollutant, applicable to federal actions in nonattainment and maintenance areas, respectively. As noted above, the area encompassing Nellis AFB remains in nonattainment for CO, PM_{10}, and O_3.

Table 2. *De Minimis* Levels for Criteria Pollutants in Nonattainment Areas by Designation (Tons/Year)

Pollutant	***Designation***	***Tons/Year***
O_3*	Serious Nonattainment	50
	Severe Nonattainment	25
	Extreme Nonattainment	10
	Other nonattainment areas outside of ozone transport region	100
	Marginal/Moderate nonattainment areas inside ozone transport region	50/100
CO	All nonattainment areas	100
SO_2**	All nonattainment areas	100
Pb	All nonattainment areas	25
NO_2	All nonattainment areas	100
PM	Moderate Nonattainment (PM_{10})	100
	Serious Nonattainment (PM_{10})	70
	Nonattainment ($PM_{2.5}$)	100

Source: 40 Code of Federal Regulations (CFR) Part 51.853.
Notes: * Includes precursors: VOCs or NO_x.
**Sulfur dioxide is often reported as sulfur oxides (SO_x).

Table 3. *De Minimis* Levels for Criteria Pollutants in Maintenance Areas by Designation (Tons/Year)

Pollutant	***Designation***	***Tons/Year***
Ozone (NO_x)	All maintenance areas	100
Ozone (VOCs)	Maintenance areas inside of an ozone transport region	50
	Maintenance areas outside of an ozone transport region	100
CO	All maintenance areas	100
SO_2	All maintenance areas	100
Pb	All maintenance areas	25
NO_2	All maintenance areas	100
PM_{10} and $PM_{2.5}$	All maintenance areas	100

Source: 40 CFR Part 51.853.

Regional Significance

A federal action that does not equal or exceed these *de minimis* criteria pollutant thresholds may still be subject to a general conformity determination. The General Conformity Rule applies if a federal action is considered to be "regionally significant," or represent 10 percent or more of a nonattainment or maintenance area's emissions inventory for that pollutant.

Exemptions and Presumptions

The final rule contains exemptions from the General Conformity process. Certain federal actions are deemed by the USEPA to conform because of the thorough air quality analysis required to comply with other statutory requirements. Examples of these actions include those subject to the New Source Review program and remedial activities under the Comprehensive Environmental Response, Compensation, and

Liability Act. Other federal actions that are exempt from the conformity process include those actions that would result in no increase in emissions, or an increase in emissions that is clearly *de minimis*. Examples include continuing or recurring activities, routine maintenance and repair, administrative and planning actions, land transfers, and routine movement of mobile assets. A federal agency can establish its own presumptions of conformity through separate rulemaking actions. Section 176(c) of the CAAA does not specifically exempt any activity, thus a separate analysis would need to show that the activity presumed to conform has no impacts to air quality. Based on this analysis, a federal agency can document that certain types of future actions would be *de minimis*.

1.3.2 Analysis

A conformity analysis for the federal action examines the impacts of the direct and indirect emissions from mobile and stationary sources. Indirect emissions are those emissions of a criteria pollutant or its precursors that are caused by the federal action but may occur later in time and/or may be farther removed in distance from the action itself but are still reasonably foreseeable; and the federal agency can control and will maintain control over the indirect action due to a continuing program responsibility of the federal agency. Reasonably foreseeable emissions are projected future indirect emissions that are identified at the time the conformity determination is made and the location of such emissions is known and the emissions are quantifiable, as described and documented by the federal agency based on its own information and after reviewing any information presented to the federal agency.

The conformity determination procedure is detailed in 40 CFR Part 93.158-159. The analysis is based upon the latest planning assumptions, the latest emission estimation techniques, applicable air quality models, databases, and other requirements of the USEPA, and on the total of direct and indirect emissions from the action(s). Finally, a formal general conformity determination must provide for mitigation measures and undertake a thorough public notification process. Exempt actions are not required to go through this process.

1.3.3 Procedure

Procedural requirements of the General Conformity Rule allow for public review of the federal agency's conformity determination. Although the conformity determination is a federal responsibility, state and local air agencies are provided notification and their expertise is consulted. The federal agency must provide a 30-day notice of the federal action and draft conformity determination to the appropriate USEPA Region (Region IX for Clark County), and state (Nevada Division of Environmental Protection), and local air control agencies (Clark County DAQEM). The federal agency must also make the determination available to the public to allow opportunity for review and comment (40 CFR 93.156).

The Draft General Conformity Determination was made available for public and agency review for 30 days. A notice of Availability was published in the *Las Vegas Review Journal* on December 10, 2009 requesting any comments on the draft document be submitted no later than January 8, 2010. The Air Force received three comment letters via U.S. Mail and one set of comments via email. Section 9.0 provides agency distribution; Attachment A provides copies of the comments received and Air Force responses to comments, where applicable.

2.0 THE F-35 BEDDOWN PROPOSAL AT NELLIS AFB, NV

Differences Between the Draft and Final Conformity Determination. While this Final Determination is, in large part, the same as the Draft, it reflects consideration of comments received during the public comment period and includes factual corrections, improvements, and/or modifications to the analyses presented in the Draft. Modifications included updated proposed construction projects and their start dates, as well as a revised timeframe for the F-35 beddown. Air quality emissions were re-evaluated; however, none of the modifications resulted in substantive changes to the conclusions presented in the Draft Determination and remain consistent with those presented here in this Final Determination.

2.1 Proposed Action Location

Nellis AFB, located in the southeast corner of the state of Nevada in Clark County, lies adjacent to the city of North Las Vegas. The unincorporated town of Sunrise Manor and undeveloped portions of Clark County surround the majority of the base, although open space dominates to the northeast. The area west of Nellis AFB supports commercial and industrial uses along Las Vegas Boulevard. Directly south and southwest of the base, a mixture of industrial, commercial, and residential land uses dominate the area.

The base, covering over 14,000 acres, is the center for Air Combat Command (ACC) training and testing activities conducted at Nevada Test and Training Range, with the base providing logistical and organizational support for aircraft operations, force development evaluation, weapons school training, and general administrative responsibility for personnel, equipment, and infrastructure. The mission of Nellis AFB is to provide realistic combat training involving every type of aircraft in the Air Force inventory. It also supports test and evaluation programs and weapons schools for all Air Force fighter aircraft: A-10s, F-15C/Ds, F-15Es, F-16s, and F-22As.

2.2 Proposed Action Description

The Air Force proposes to base 36 F-35 fighter aircraft at Nellis AFB between 2012 and 2020. The aircraft would be assigned to the Force Development Evaluation (FDE) program and Weapons School (WS) at Nellis AFB. For further detail of the proposed action, please visit the ACC website at www.accplanning.org to download the Environmental Impact Statement associated with this proposal.

Table 4 presents the major milestones of the aircraft beddown schedule, while this schedule differs from that presented in the 2009 Draft Conformity analysis, the end result of 36 F-35 aircraft has not altered.

Table 4. Proposed F-35 Beddown Schedule

Aircraft	*Baseline*	*2012*	*2015*	*2017*	*2018*	*2019*	*2020*
F-35 (FDE)	0	4	+2 (6)	6	+6 (12)	12	12
F-35 (WS)	0	0	1	+6 (7)	+9 (16)	+4 (20)	+4 (24)
Total F-35	***0***	***4***	***11***	***13***	***28***	***32***	***36***
Nellis AFB Based Aircraft*	113	113	113	113	113	113	113
Total	**113**	**119**	**124**	**126**	**141**	**145**	**149**

* Nellis AFB assigned aircraft include HH-60, A-10, F-15C, F-15E, F-16, and F-22A.

As of March 2011, the Air Force anticipates that the first four F-35s would arrive for FDE program beddown in 2012; in 2015 F-35s would begin to arrive to support the WS beddown. These aircraft would remain at Nellis AFB into the foreseeable future since the requirements for the FDE program and WS remain as long as the Air Force retains the F-35. Operationally, the 36 F-35s would conduct a maximum of 17,280 annual airfield operations by 2020 (an airfield operation represents the single movement or individual portion of a flight in the base airfield environment such as one takeoff, one landing, or one transit of the airport traffic area).

Between 2011 and 2014, the proposed F-35 beddown would require construction of new facilities and alteration and demolition of existing facilities; disturbing about 36 acres. No construction projects related to this beddown are planned after 2016. Table 5 summarizes the anticipated construction, demolition, and renovation to support the proposed F-35 beddown at Nellis AFB. It also presents the anticipated sequence of infrastructure changes over the period from 2011 through 2014. Since publication of the 2009 Draft Conformity analysis, four projects have been removed from the proposed action: FY09 airfield pavement, FY10 munitions igloo, FY11 airfield pavement, and FY13 munitions igloo. Other project changes include sliding the construction start dates and addition of seven new facilities (highlighted in gray). While the list below reflects proposed construction/demolition as of March 2011, it is anticipated that these projects may be changed, start dates moved, or additional projects identified as the beddown progresses. If this occurs, the appropriate NEPA documentation will be undertaken to assess potential impacts.

Table 5. Proposed Construction and Demolition Actions for the F-35 Beddown

Project	*Area (square feet)*	*Base Area*	*Start Date Year*	*Demolish Building #*
A-10 Thunder Aircraft Maintenance Unit (AMU)	11,000	B	**FY11**	
6-Bay F-35 Hangar/AMU	80,988	B	**FY11**	265, 268, 269
Aircraft Washrack Addition, 1-bay to Building 271	9,551	B	**FY11**	
B10425 Munitions Facility Addition at Building 10425	3,000	MSA	**FY11**	
25-mm Munitions Storage Facility Addition at M81	3,000	MSA	**FY11**	
Munitions Trailer Facility	10,000	MSA	**FY11**	
2 MSA Loading Docks	1,000	MSA	**FY11**	
Precision-Guided Missile Bay Addition at Building 10439	3,000	MSA	**FY11**	
Parking/landscape areas	15,656	B	**FY11**	

Table 5. Proposed Construction and Demolition Actions for the F-35 Beddown				
Project	***Area (square feet)***	***Base Area***	***Start Date Year***	***Demolish Building #***
Flight Test Instrumentation Facility	4,650	B	**FY11**	
422 Test Evaluation Squadron Operations Facility	20,300	B	**FY11**	
Flight Simulator Facility	20,000	B	**FY11**	
FY11 Subtotal	***182,145***			
Aerospace Ground Equipment (AGE) Complex	45,000	A	**FY12**	
Engine Shop Addition	9,000	C	**FY12**	
53 WG Test Squadron Operations Building	20,000	C	**FY12**	
FY12 Subtotal	***74,000***			
Parking/landscape areas	190,301	B	**FY13**	
Weapons School Addition at Building 282	10,000	B	**FY13**	
Alternate Mission Equipment Storage Facility	25,285	A	**FY13**	
Fuel Cell Hangar Addition	16,300	B	**FY13**	
Munitions Maintenance Facility Addition	6,000	MSA	**FY13**	
FY13 Subtotal	***247,886***			
Weapons Release Building	15,000	B	**FY14**	441
Parts Store	40,000	B	**FY14**	413, 415
East Ramp/Airfield Pavement	495,140	D	**FY14**	
Live Ordnance Loading Area (LOLA) Expansion	167,322	D	**FY14**	
Bomb Build-Up Pad	30,000	MSA	**FY14**	
Low Observables (L/O) Composite Addition	11,018	B	**FY14**	
4-Bay F-35 Hangar/Strike AMU	31,000	B	**FY14**	258
L/O Corrosion/Wash 3-Bay Hangar	15,800	B	**FY14**	250
Parking/landscape areas	96,486	B	**FY14**	
Fuel Cell Hangar	50,250	B	**FY14**	
FY14 Subtotal	***952,016***			
Total	**1,572,829**			

Personnel positions at Nellis AFB would be increased by a total of 412 by completion of the beddown in 2020. Personnel changes begin in 2012 with a total of 222 personnel being added at the base to support the FDE program in years 2012 and 2016. In 2014, before the start of the WS program, another 175 personnel would be added. In 2020, an additional 15 personnel would arrive at which point personnel positions at Nellis AFB would peak. The F-35 FDE and WS personnel would constitute a 3.4 percent increase in overall 2006 base personnel levels of 12,284.

2.3 Elements of the Proposed Action Impacting Air Quality

The following elements, associated with the F-35 FDE and WS beddown, would contribute emissions and have the potential to impact air quality:

- F-35 aircraft operations and maintenance activities within the base boundaries and in airspace above Nellis AFB;
- construction, alteration, and demolition that would disturb 36 acres over the 6-year construction period; and
- the additional 412 personnel.

For purposes of this F-35 beddown conformity determination, emissions were modeled in 2012, 2015, and 2016, when aircraft operations, construction/demolition activities, and additional commuting personnel would coincide and from 2017 through 2020, when the beddown comprises additional F-35 and personnel.

3.0 EXISTING REGIONAL AIR QUALITY

3.1 Meteorological Conditions

Nellis AFB is located in the Mojave Desert, with a climate marked with hot summers, mild winters, abundant year-round sunshine, and very little rainfall. High temperatures in the 90-degrees Fahrenheit (°F) range are common in the months of May, June, and September and temperatures normally exceed 100°F most days in the months of July and August, with very low humidity, frequently under 10 percent. Winters are cool and windy, with the majority of Las Vegas' annual 4.49 inches of rainfall coming from January to March. Winter daytime highs are normally around 60°F with nighttime lows typically around 40°F. The Sierra Nevada mountain range stretches along Nevada's western border thereby interrupting the prevailing easterly flow of storm systems, resulting in a "rain shadow", and thus limiting the amount of precipitation within the Las Vegas Valley. Typically, as much as 75 percent of Nevada's precipitation falls during the winter.

Showers occur less frequently in the spring and autumn. July through September, the Mexican Monsoon, often brings enough moisture from the Gulf of California and into the southwest to create afternoon and evening thunderstorms. Although winter snow is usually visible from December to May on the mountains surrounding Las Vegas, it rarely snows in the city itself.

The scarcity of surface water resources is attributed to a dry regional climate characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average precipitation depends mainly on elevation and ranges from 4 inches on the desert floor to 16 inches in the mountains. With the exception of locally intense thunderstorms, that can produce flash flooding, much of the warm-weather precipitation is lost to the atmosphere through evaporation and transpiration. Flash floods produce high peak flows over short periods of time.

3.2 Existing Air Quality Attainment Status

Clark County, including Las Vegas, was designated in "Subpart 1 (Basic) nonattainment" of the 8-hour ozone standard on September 13, 2004 (USEPA ND). In June 2007 the USEPA determined that areas found in classified nonattainment under Subpart 1 (which applies to the Las Vegas Valley) would not be required to demonstrate attainment in 2007. This action has obligated Clark County to develop an early progress plan that contains motor vehicle emission budgets that address the ozone standards in advance of

a complete attainment demonstration. Progress is demonstrated if projected emissions by June 15, 2009 attainment date (2008 ozone season) are less than emissions in the 2002 base year. Clark County (as a revision to the state's ozone SIP) submitted their Ozone Early Progress Plan to USEPA in July 2008 and in May 2009 the USEPA found that the emissions budgets contained therein were adequate to demonstrate progress towards attainment (74 *Federal Register* [FR] 22738). In March 2011, Clark County submitted to the USEPA their *Request for Ozone Redesignation and Maintenance Plan* (or Plan). Upon USEPA approval of the Plan, the emissions goals contained therein will be regulated by the County.

In January 1993, the Las Vegas Valley was designated a serious nonattainment area for PM_{10} and in June 2001 submitted its SIP to USEPA for approval (CCHD 2001). In May 2004, USEPA approved the Clark County PM_{10} SIP and by so doing approved a series of rules adopted by the Clark County DAQEM that control fugitive dust sources, including disturbed vacant lots, construction sites, unpaved roads, paved roads, and unpaved parking lots (Clark County 2005). In December 2006, the USEPA approved the Clark County portion of the Nevada PM_{10} SIP. In August 2010, USEPA determined that the Las Vegas Valley had reached attainment of this criteria pollutant by the applicable date of December 31, 2006 (75 FR 45485). This determination was not a redesignation because the USEPA has not approved an applicable PM_{10} Maintenance Plan; therefore, the Valley remains in serious nonattainment until Nevada meets the CAA requirements for redesignation of the Valley to attainment (75 FR 45485).

The Las Vegas Valley was also designated a serious nonattainment area for CO in November 1997. CO is a colorless, odorless gas created from the burning of fossil fuels such as gasoline, oil, or wood. Automobiles produce 85 percent of the valley's CO emissions. The County submitted a SIP to control CO in August 2000 (CCHD 2000) and the SIP was approved by USEPA in October 2004. Clark County submitted a revised CO SIP in October 2005, to update CO emissions budgets using the latest model (MOBILE 6) approved by USEPA for transportation conformity determinations. USEPA published approval of the revision in September 2006. In 2008 the county submitted a CO Maintenance Plan and formal request for formal redesignation to USEPA (CC DAQEM 2008a). In September 2010 USEPA approved the Plan and request for redesignation (75 FR 59090).

Under the U.S. Air Force Conformity Guide (Air Force 2003), emissions must be below *de minimis* levels for pollutants in nonattainment to be exempt from a formal conformity determination. Proposed actions that exceed these thresholds in any given year must undergo a detailed analysis and a formal conformity determination is required. *De minimis* thresholds for the NAAQS nonattainment pollutants in the Las Vegas Valley are listed in Table 6.

Table 6. Criteria Pollutant *De Minimis* Emission Rates Applicable to Las Vegas Valley, NV[1]			
Tons/Year			
VOCs	***NO_x***	***CO***	***PM_{10}***
100	100	100	70[3]

Source: 40 CFR Part 51.853 and 40 CFR Part 93.153.

3.3 Regional Baseline Emissions

Air emissions at Nellis AFB are primarily generated from mobile sources (i.e., vehicles and aircraft), equipment found in maintenance shops, boilers, and paint booths. As demonstrated in Table 7, Nellis AFB contributes minimal amounts (less than 1 percent) of criteria pollutants in Clark County. Rather, vehicle traffic and construction outside of the base account for most of the emissions. Thus, all regional contributions by the base remain well below 10 percent significance level.

Table 7. Summary of Baseline Emissions at Nellis AFB					
Source	***Tons/Year***				
	VOCs	***CO***	***NO_x***	***SO_2***	***PM_{10}***
Ground-Based[1]	13.42	13.50	29.63	1.10	14.4
Aircraft[2]	318	928	444	345	26
Total	**331.4**	**941.5**	**473.6**	**346.1**	**40.4**
Clark County[3]	43,980	306,425	73,360	52,782	46,717
Nellis AFB Percent Contribution	0.7	0.3	0.6	0.6	0.1

Sources: Air Force 2009, Air Force 1999, and USEPA 2011.
Note: [1]Ground-based emissions derived from 2009 Air Emissions Inventory (AEI) at Nellis AFB.
[2]Aircraft emissions derived from F-22A Beddown EIS (most recent evaluation of mobile sources).
[3]2005 county emissions retrieved from USEPA Air Data website.

The total annual CO emissions at Nellis AFB represent about 0.7 percent of total CO emissions for Clark County. PM_{10} emissions account for about 0.1 percent and both VOCs and NO_x (ozone precursors) represent less than 1 percent of the total Clark County contribution. Under 2009 conditions, none of these pollutants represents a significant regional contribution generated by Nellis AFB.

4.0 GENERAL CONFORMITY DETERMINATION

In accordance with 40 CFR Part 93, Subpart B, 40 CFR Part 51, Subpart W and the 2003 U.S. Air Force Conformity Guide, the incremental increase in emissions above the existing conditions was considered and includes reasonable foreseeable direct and indirect emissions. Appendix D of this EIS provides the specific input used to determine total emissions for this proposal. These data were based on the expected number, type, and duration of aircraft operations within the airspace at Nellis AFB. These data also include construction and demolition activities, workers commuting, construction equipment

transportation, as well as additional Air Force personnel commuting. Total emissions for each year were calculated based on current best estimates of construction timeframes and aircraft arrivals to the base.

The analysis assumed that all construction equipment was manufactured before 2000. The analysis also inherently reduced PM_{10} fugitive dust emissions from earth-moving activities by 50 percent as this control level is included in the emission factor itself. Emission factors for fugitive dust were estimated using guidelines outlined in the Western Regional Air Partnership (WRAP) fugitive dust handbook (WRAP 2004). These guidelines were developed for use in western states and they assume standard dust mitigation best practices activities of 50 percent from wetting; Nellis AFB would mitigate fugitive dust emissions through use of WRAP soil wetting guidelines. After PM_{10} is estimated, the fraction of fugitive dust emitted as $PM_{2.5}$ is estimated, and the most recent WRAP study (MRI 2005) recommends the use of a fractional factor of 0.10 to estimate the $PM_{2.5}$ portion of the PM_{10}. Specific ratios of PM_{10} to $PM_{2.5}$ in diesel exhaust are not yet published, therefore, for purposes of these calculations PM emissions have been equally distributed between PM_{10} and $PM_{2.5.}$

Construction, demolition, and/or renovation emissions were estimated based upon the total square footage associated with each project and the assumed timeline for these activities, extending from 2011 through 2016. Approximately 36 acres would be disturbed over that time period.

Emissions for the F-35 aircraft engine (F-135) were calculated using data provided by the Joint Strike Fighter Program Office in charge of design and development of the F-35 aircraft. In terms of maintenance, the Air Force also used the F-16 aerospace ground equipment (AGE) as a surrogate since F-35 equipment is still in the research stage. The AGE emissions were obtained using the default settings for the F-16 AGE surrogates in the Air Force Conformity Applicability Model (ACAM) 4.3.3. Because the proposed action is scheduled to take place over several years, emissions were calculated for the years in which the F-35 would be phased into the Nellis AFB inventory and overlap with construction activities.

Mobile source emissions were calculated for construction workers for each of the construction years using MOBILE6 modeling. This analysis assumed that no new construction jobs would be created under the proposed action, so no new commuting emissions to and from the base would be incurred within the regional area. This assumption is justified because it is highly probable that these workers would be traveling somewhere in the Las Vegas Valley for their jobs, so going to Nellis AFB would not introduce new emissions; the average mileage that was assumed for each worker was 4 miles to account for on-base trips and driving during breaks. It was assumed that the speed of the vehicle would not exceed an average of 30 miles per hour.

Using MOBILE6 modeling, emissions from commuting Air Force personnel were also calculated for those years in which the additional personnel would come to the base (2012, 2017, and 2022) and assumed that only 87 percent of these additional personnel would commute to and from the base. This assumption is supported by the Bureau of Transportation Statistics (BTS 2001) which indicate that 87 percent of the U.S. population drives their car to and from work. These calculations also assumed a round trip distance of 20 miles per day, at a rate not exceeding an average of 30 miles per hour (South Nevada Regional Transportation Commission 2007). Table 8 presents these emissions and Appendix D of the EIS provides the supporting documentation for these totals.

Table 8. Projected Pollutant Emissions from Combined Construction, Commuting, and Aircraft Operations Compared to Significance Thresholds

Year/Emission Source	*Tons/Year*					
	VOCs	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
2012						
Aircraft	0.67	8.00	18.67	0.67	5.33	5.17
AGE	0.34	4.05	2.06	0.16	0.11	0.10
*Commuting Personnel	0.98	12.36	0.79	0.01	0.03	≤ 0.03
Construction	0.86	7.53	5.04	0.55	2.12	1.49
Total	**2.85**	**31.94**	**26.56**	**1.39**	**7.59**	**6.79**
2015						
Aircraft	1.83	22.92	50.42	2.75	15.58	15.12
AGE	0.94	11.15	5.67	0.44	0.29	0.28
*Commuting Personnel	1.14	17.25	0.82	0.02	0.05	≤ 0.05
Construction	0.69	6.37	3.97	0.44	2.22	0.44
Total	**4.60**	**57.69**	**60.88**	**3.65**	**18.14**	**15.89**
2016						
Aircraft	1.83	22.92	50.42	2.75	15.58	15.12
AGE	0.94	11.15	5.67	0.44	0.29	0.28
*Commuting Personnel	1.07	16.75	0.82	0.02	0.05	≤ 0.05
Construction	0.67	6.23	3.97	0.44	2.22	0.44
Total	**4.51**	**57.05**	**60.88**	**3.65**	**18.14**	**15.89**
2017						
Aircraft	2.17	54.17	119.17	6.50	36.83	35.73
AGE	2.21	26.35	13.39	1.04	0.69	0.67
*Commuting Personnel	1.02	16.36	0.71	0.02	0.05	≤ 0.05
Total	**5.40**	**96.88**	**133.27**	**7.56**	**37.57**	**36.45**
2018						
Aircraft	4.67	58.33	128.33	7.00	39.67	38.48
AGE	2.38	28.37	14.42	1.12	0.75	0.72
*Commuting Personnel	0.98	15.99	0.67	0.02	0.05	≤ 0.05
Total	**8.03**	**102.69**	**143.42**	**8.14**	**40.47**	**39.25**
2019						
Aircraft	5.33	66.67	146.67	7.11	44.44	43.11
AGE	2.72	32.43	16.48	1.28	0.85	0.83
*Commuting Personnel	0.81	15.73	0.94	0.02	0.05	≤ 0.05
Total	**8.86**	**114.83**	**164.09**	**8.41**	**45.34**	**43.99**

Table 8. Projected Pollutant Emissions from Combined Construction, Commuting, and Aircraft Operations Compared to Significance Thresholds

Year/Emission Source	*Tons/Year*					
	VOCs	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
2020						
Aircraft	6.00	75.00	165.00	8.00	50.00	48.5
AGE	3.06	36.48	18.54	1.44	0.96	0.93
*Commuting Personnel	0.81	16.16	0.64	0.02	0.05	≤ 0.05
Total	**9.87**	**127.64**	**184.18**	**9.46**	**51.01**	**49.48**
De minimis Threshold	100	100	100	-	70	-
Major Source Threshold	-	-	-	250	-	250
Proposed GHG Threshold						25,000

Note: *Commuting emissions decrease over the years (even with same number of commuters) because each year emissions improve as newer cars replace older cars.

4.1 Conformance Procedures

The following steps were used to determine air quality conformance:

Step 1: Is the action located in an air quality nonattainment or maintenance area?
Response: Yes, the proposed action occurs in areas designated as subpart 1 (basic) nonattainment for the 8-hour ozone standard, serious nonattainment for PM_{10}, and serious nonattainment for CO.

Step 2: Do the actions result in the emission of criteria pollutants?
Response: Yes, the proposed action involves use of vehicles, machinery and other equipment that generate air contaminants, including ozone precursors (NO_x and VOCs), as well as PM_{10} and CO. The proposed action would primarily involve the use of diesel-powered construction equipment and military aircraft.

Step 3: Are the actions or portion of the actions exempt from conformity requirements?
Response: No.

Step 4: Are the actions presumed to conform?
Response: No. No “presumed to conform” categories exist at this time.

Step 5: Are the direct emissions associated with the actions reasonably foreseeable?
Response: Yes, the F-35 beddown has been publicly announced and NEPA evaluations are on-going.

Step 6: Are the indirect emissions associated with the actions reasonably foreseeable?
Response: Yes. Aircraft, equipment, and commuting emissions would continue into the future but would not exceed those emissions presented in 2022.

Step 7: **Can the indirect emissions associated with the actions be practically controlled due to continuing program responsibilities?**

Response: Yes, emissions from surface painting; metal plating, welding, and degreasing operations; incinerators; as well as heating and power production can be practically controlled through existing Nellis AFB air emissions control programs.

Step 8: **Determination of total emissions.**

Response: The emissions from the proposed action were calculated and are presented in Section 5.0.

Step 9: **Are the total emissions from the actions below *de minimis* levels?**

Response: No. In 2022 the total emissions for the proposed action exceed *de minimis* rates for NO_x and CO as specified in the General Conformity Rule. The Air Force has consulted with Clark County DAQEM and following modeling done by Clark County, it was determined that no measurable differences at any Clark County monitor in future design values, exceed the 84-parts per billion 8-hour ozone standard (see Attachment B, DAQEM 2008). In addition, DAQEM indicated that "any ozone modeling that DAQEM may incorporate in the 1997 8-hour ozone SIP submittal will include emissions from the F-35 project (Attachment B)." In regards to CO, DAQEM has included the F-35 emissions in their modeling and has determined that there are no exceedances (DAQEM 2008). The results and conclusion are presented in Sections 5.0 and 7.0, respectively.

Step 10: **Are the actions regionally significant?**

Response: No.

4.2 Emissions Calculations

4.2.1 Construction/Demolition

The facility construction and demolition areas of disturbance were derived from military construction project data forms that provide the specifics (e.g., size, infrastructure, parking, and landscaping) for each facility (Air Force VD). Construction equipment engine emissions were calculated as follows:

Engine Emissions (Total) = Emission Factor (EF) (ton/hp-hr) x Engine Power (hp) x Load Factor (LF) x # vehicle/equipment x Work-day x Project Duration
EF = average engine emissions of pollutant per unit of use (ton/hp-hr)
LF = typical load factor (e.g., 79 percent)
Work-day = operational time/day (e.g., 8 hours)
Project Duration = total number of work-days (e.g., 20 days)

Factors for construction source emission rates were derived from *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling* (USEPA 2004a); *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition* (USEPA 2004b); *Nonroad Engine and Vehicle Emission Study—Report* (USEPA 1991); *Conversion Factors for Hydrocarbon Emission Components* (USEPA 2005); *Comparison of Asphalt Paving Emission Factors* (CARB 2005); *WRAP Fugitive Dust Handbook* (WRAP 2006); *Analysis of the Fine Fraction of Particulate Matter* (MRI 2005); and *Mobile 6.2.*

Vehicle emissions calculations for construction workers and Air Force personnel commuting in privately-owned vehicles (POVs) employed *EMFAC 2002* (v2.2) *Emission Factors (On-Road)* (CARB 2002). The analysis estimated emission rates for fugitive dust using guidelines outlined in the WRAP fugitive dust handbook (WRAP 2004). These guidelines, developed for use in western states, assume standard dust mitigation best practices activities. After estimating PM_{10} , the fraction of fugitive dust emitted as $PM_{2.5}$ was calculated based on the most recent WRAP study (MRI 2005) that recommends the use of a fractional factor of 0.10 to estimate the $PM_{2.5}$ portion of PM_{10}. Emissions calculations for all sources can be found in Appendix D of this EIS.

4.2.2 Aircraft Operations

Aircraft emission estimates for the F-35 aircraft were prepared using data provided by the Air Force. Emission factors used in the analysis derive from engine test operations and are provided in Appendix D of this EIS.

5.0 RESULTS

To assess whether a conformity determination was required, the year in which the maximum amount of emissions would be generated (i.e., FY24) was used, these totals were then compared to *de minimis* thresholds, and the projected percent contribution to the regional air quality calculated (Table 9).

Table 9. Maximum (FY20) Projected Action Emissions Compared to De Minimis Thresholds and 2005 Regional Emissions (Tons)

	VOCs	***NO_x***	***CO***	***PM_{10}***
Clark County 2005 Emissions	43,980	73,360	306,425	46,717
Proposed Action FY20 F-35 Emissions8	9.06	183.54	111.48	50.96
De minimis Threshold	100	100	100	70
Percent Regional Contribution	0.02	0.25	0.04	0.11

**Note*: This includes aircraft and AGE emissions.

Regionally, emissions would represent less than 1 percent of the regional contribution for any of the pollutants of concern in the year anticipated to incur the most pollutant emissions—FY20. In terms of *de*

minimis levels, they are exceeded in FY20 for CO and NO_x. Consultation with DAQEM and their subsequent modeling indicated that no exceedances of CO would occur to preclude meeting CO standards in the SIP. For NO_x, a precursor ozone pollutant, DAQEM also determined that future design values are still below the 84-parts per billion 8-hour ozone standard when F-35 emissions are included (DAQEM 2008).

6.0 REGULATORY ANALYSIS

Under the provisions of CAA § 176(c) [42 USC § 7506(c)] as implemented by 40 CFR Part 93, Subpart B; 40 CFR Part 51, Subpart W; 32 CFR § 989.30 and Air Force Instruction 32-7040, the Air Force is required to make a positive conformity determination for the proposed action before any part of the action may be implemented. SAF/IEE is the lowest ranking designated official to make conformity determinations for Air Force and this authority is not delegable below SAF/IEE (Air Force Instruction 32-7040, Paragraph 2.4.3).

As noted earlier, there are six criteria pollutants for which conformity must be analyzed for the proposed action. The criteria pollutants are: 1) ozone (O_3), 2) carbon monoxide (CO), 3) nitrogen dioxide (NO_2), 4) sulfur dioxide (SO_2), 5) particulate matter (PM) less than 10 and 2.5 micrometers (PM_{10} and $PM_{2.5}$), and 6) lead (Pb). No conformity determination must be made for $SO_{2,}$ $NO_{2,}$ PM_{10} or $PM_{2.5}$ or Pb since the emissions from the proposed action are for a criteria pollutant where conformity is not required, or the proposed emissions are *de minimis*.

With respect to CO, Clark County DAQEM has informed the Air Force (Attachment B) that it included emissions from this F-35 project in its area-wide modeling that has already been submitted to USEPA as part of DAQEM's Maintenance Plan for CO. DAQEM observed that the F-35 project's emissions are very small in proportion to the total CO emissions inventory in the Las Vegas Valley, and concluded that no additional local air quality modeling or hot-spot analysis is necessary. Therefore, a positive conformity determination for CO may be made on this basis in accordance with 40 CFR Part 93.158(a)(4)(ii).

For ozone, there is no SIP budget since USEPA has not implemented regulations to mandate SIP submittals from 26 different areas (74 FR 2944, January 16, 2009) and several of these areas, including Las Vegas, with a proposed "Marginal" non-attainment status have since reached attainment. As mentioned above, Clark County DAQEM has submitted the *Clark County Ozone Request for Redesignation and Maintenance Plan* (or Plan). F-35 and AGE specific emissions have been accounted for in the 2015 and 2022 ozone maintenance goals (CC DAQEM 2011). In Section 4.0 of the Plan, Tables 4-3 and 4-4, all F-35 operational and AGE emissions are accounted for in terms of CO, NO_x, and VOCs (precursor pollutants of ozone). In 2020, total ozone emissions would not exceed those identified in this Plan and therefore a positive determination was made by the Air Force.

Clark County has issued a commitment in this Plan to include the emissions described in this conformity analysis and the Draft Environmental Impact Statement issued in March 2008 in accordance with 40 CFR Part 93.158(a)(5)(i)(B). Federal agencies are authorized to make a conformity determination based on this commitment. Clark County has followed USEPA guidance which allows the county to make such a commitment notwithstanding the fact that there is no SIP in place. (General Conformity Q's & A's, p. 2, Bubbling Activities, Q &A 1, October 19, 1994.

7.0 CONCLUSION

Based on this evaluation of the emissions associated with implementation of this proposed action (both construction and F-35 operations), in FY20 the estimated emissions rates of NO_x and CO would exceed the 100 tons per year applicability threshold in Clark County, NV by 83.54 and 11.48 tons per year, respectively. As shown in Table 9, these project emissions would represent less than 10 percent of the area emissions of these nonattainment pollutants, and would, therefore, not be subject to general conformity requirements based upon regional significance.

8.0 FINDING OF CONFORMITY

The Air Force has reviewed and evaluated the documentation. The Air Force may issue a positive conformity determination for the proposed action in accordance with 40 CFR § 93.158 (a)(5)(i)(B) for the NO_x emissions analyzed in the proposed action. The Air Force may also issue a positive conformity determination for the CO emissions based on 40 CFR § 93.158(a)(4)(ii).

9.0 DISTRIBUTION LIST

The Draft General Conformity Determination was sent to the following agencies:

Mr. Wayne Nastri
Regional Administrator
USEPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105

Mr. Willie R. Taylor
Director, Office of Environmental Policy and Compliance
U.S. Department f the Interior
Main Interior Building (MS2342)
1849 C Street, NW
Washington, D.C. 20240

Ms. Leo Drozdoff
Administrator
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4002
Carson City, NV 89701

Mr. Larry Brown
Chairman
Regional Transportation Commission of Southern Nevada
600 s. Grand Central Pkwy., Ste 350
Las Vegas, NV 89106

Mr. Lewis Wallenmeyer
Director
Clark County Department of Air Quality and Environmental Management
500 S. Grand Central Parkway, 1st Floor
Las Vegas, NV 89155

10.0 REFERENCES

Bureau of Transportation Statistics (BTS). 2001. Distribution of Trips by Mode of Transportation. http://www.bts.gov/publications/highlights_of_the_2001_national_household_travel_survey/htm/table_a10.html.

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Clark County Health Department (CCHD). 2001. PM_{10} State Implementation Plan, Las Vegas, NV. June.

_____. 2000. Carbon Monoxide State Implementation Plan, Las Vegas, NV. August.

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_____. 2007. Clark County Ozone Redesignation Request to USEPA. Las Vegas, NV. June.

Code of Federal Regulations, Title 40, Protection of the Environment, Chapter I, Environmental Protection Agency, Subchapter C, Air Programs: Part 50, National Primary and Secondary Ambient Air Quality Standards; and Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans.

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_____. 2004b. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition. Report No. NR-009c. April.

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ATTACHMENT A

COMMENTS AND RESPONSES FOR THE DRAFT CONFORMITY DETERMINATION

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

MEMORANDUM FOR SEE DISTRIBUTION LIST

FROM: HQ ACC/A7
129 Andrews Street, Suite 122
Langley AFB, VA 23665-2769

SUBJECT: F-35 Force Development Evaluation and Weapons School Beddown Draft General Conformity Determination

1. We are pleased to provide you with a copy of the Draft General Conformity Determination for the proposed F-35 Beddown at Nellis Air Force Base (AFB), Nevada. The Draft General Conformity Determination has been prepared in accordance with the Clean Air Act and Amendments (CAAA). Libraries are requested to file this document for public access and reference.

2. Under the provisions of the CAAA General Conformity Rule (40 C.F.R. Part 93, Subpart B), a federal agency must assess whether their proposed action would contribute to further degradation of air quality or prevent attainment of air quality standards in areas that are in non-attainment or maintenance and determine that the proposed action's implementation is consistent with the provisions of the CAAA General Conformity Rule. The U.S. Air Force proposes to beddown up to 36 F-35A aircraft at Nellis AFB which would contribute to regional air emissions with the Las Vegas Valley, an area that is in non-attainment or is in a maintenance status for one or more criteria pollutants

3. The 30-day comment period on the Draft General Conformity Determination begins 10 December 2009 and ends 8 January 2010. Send comments to: HQ ACC/A7PS, 129 Andrews Street, Suite 337, Langley AFB, Virginia 23665-2769, ATTN: Ms. Sheryl Parker If you have questions pertaining to the Draft General Conformity Determination or the F-35A proposal, please contact Ms. Parker at (757) 764-9334.

DAVE C. HOWE
Brigadier General, USAF
Director, Installations and Mission Support (A7)

2 Attachments:
1. Distribution List
2. Draft General Conformity Determination

DISTRIBUTION LIST

Mr. Wayne Nastri
Regional Administrator
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105

Mr. Willie R. Taylor
Director, Office of Environmental Policy
and Compliance
U.S. Department f the Interior
Main Interior Building (MS2342)
1849 C Street, NW
Washington, D.C. 20240

Ms. Leo Drozdoff
Administrator
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4002
Carson City, NV 89701

Mr. Larry Brown
Chairman
Regional Transportation Commission of Southern Nevada
600 s. Grand Central Pkwy., Ste 350
Las Vegas, NV 89106

Mr. Lewis Wallenmeyer
Director
Clark County Department of Air Quality
and Environmental Management
500 S. Grand Central Parkway, 1st Floor
Las Vegas, NV 89155

Alamo Branch Library
100 North 1st Street
Alamo, NV 89001

Las Vegas Library, Reference Dept
833 Las Vegas Blvd., North
Las Vegas, NV 89101

Beatty Library District
400 North 4th Street
Beatty, NV 89003

Boulder City Library
701 Adams Blvd

Boulder city, NV 89005

Caliente Branch Library
100 Depot Ave
Caliente, NV 89008

Nevada state Library and Archives Federal Publications
100 N. Stewart Street
Carson City, NV 89701

Lied Library
4505 Maryland Parkway, Box 457001
Las Vegas, NV 89154

North Las Vegas Library District - Main Branch
2300 Civic Center Drive
North Las Vegas, NV 89030

Pahrump Community Library
701 East Street
Pahrump, NV 89048

Community College of Southern Nevada Library
Cheyenne Campus
3200 E. Cheyenne Avenue
North Las Vegas, NV 89030

Business and Government Info Center/322
University of Nevada Libraries
1664 N. Virginia St.
Reno, NV 89557

Tonopah Public Library
171 Central
Tonopah, NV 89049

Lincoln County Library
15 Main Street
Pioche, NV 89043

From:	Parker, Sheryl K Civ USAF HQ AF ACC/A7PS
To:	Rose, Kathy L; Hoffman, Charee
Subject:	FW: Nellis AFB F-35 Beddown and Weapons School Draft General Conformity Determination
Date:	Monday, March 08, 2010 9:37:55 AM

These were the EPA comments on the draft conformity determination.

-----Original Message-----
From: Kelly.Johnj@epamail.epa.gov [mailto:Kelly.Johnj@epamail.epa.gov]
Sent: Thursday, January 14, 2010 7:59 PM
To: Parker, Sheryl K Civ USAF HQ AF ACC/A7PS
Cc: Wehling.Jefferson@epamail.epa.gov; Hanf.Lisa@epamail.epa.gov; OConnor.Karina@epamail.epa.gov
Subject: Nellis AFB F-35 Beddown and Weapons School Draft General Conformity Determination

Hi Sheryl - Thanks for the inquiry about our input on the general conformity proposed determination. If you received any public comments and would like to discuss those or our thoughts below, please let us know. We'd be glad to assist. Regards, John

(1) ES-3 identifies a maintenance plan requirement where there is none, i.e., absent a redesignation request, which is also not a requirement. A nonattainment area may stay nonattainment as long as it wants. However, section 175A of the Act does require a maintenance plan when a State decides to request redesignation to attainment. The subject sentence [need cite] could be revised as follows: "DAQEM and the State of Nevada have issued a commitment to include the NOx emissions in the maintenance implementation plan that DAQEM and the State intend to must submit pursuant to the provisions of 42 U.S.C. (section) 7505a in connection with a redesignation to attainment request under 42 U.S.C. (section) 7407(d)."

(2) We note that the Air Force's reliance on the state's commitment to submit a SIP revision (effective upon the date of the final conformity determination) will trigger an 18-month deadline for submittal of a SIP revision, which is anticipated to be an 8-hour ozone maintenance plan. No suggested edit.

(3) a. Noting that year 2022 is the highest PM emissions year, we expect that fugitive dust emissions (which would be highest in 2013) take into account control measures, whereas aircraft PM emissions (which would be highest in 2022) are uncontrolled. The conformity determination should clarify and confirm this, if correct.

b. We couldn't confirm that fugitive dust emissions from tire wear and re-entrained road dust (construction worker vehicle trips and project-related commute trips), and fugitive emissions from tire wear from aircraft landings were included in emissions estimates. We suggest either adding such analysis or explaining how it is already included, if that is the case. If, for example, tire wear emissions and re-entrained road dust are not included in your MOBILE modeling results, these emissions should be estimated and added to the MOBILE results. PM numbers would certainly increase, but we do not anticipate the increase would be so large as to cause de minimis levels for PM to be exceeded.

c. The General Conformity determination should identify the Clark

County rules to which the project would be subject and that can thus be relied upon to reduce construction-related PM and VOC emissions. These rules include Clark County Air Pollution Regulations Section 94 - Permitting and Dust Control for Construction Activities, and Section 60.4 - Cutback Asphalts.

(4) On page 22, the GC determination cites 40 CFR 51.858 as the criterion for determining conformity for CO. To the contrary, we understand the Air Force would be relying on 40 CFR 93.158(a)(4)(ii) and related Clark County DAQEM CO (areawide) modeling results from the submitted (but not yet approved) CO Maintenance Plan. If correct, then DAQEM's email (dated 8/21/09 from S. Deyo to Sheryl Parker) documenting the decision by DAQEM not to require the Air Force to conduct local CO modeling but to rely on DAQEM's own areawide CO modeling should be included along with the commitment letters at the back of the report.

DAQEM

DEPARTMENT OF AIR QUALITY & ENVIRONMENTAL MANAGEMENT
500 S Grand Central Parkway 1st Floor · Box 555210 · Las Vegas, NV 89155-5210
(702) 455-5942 · Fax (702) 383-9994
Lewis Wallenmeyer Director · Tina Gingras Assistant Director

December 29, 2009

Ms. Sheryl Parker
HQ ACC/A7PS
129 Andrews Street, Suite 337
Langley AFB, VA 23665-2769

RE: F-35 Force Development Evaluation and Weapons School Beddown Draft General Conformity Determination

Dear Ms. Parker:

The Clark County Department of Air Quality and Environmental Management reviewed the Draft General Conformity Determination, and we concur with the finding of conformity. We participated in the development of this document. We have no further comments.

Thank you for the opportunity to review this document. If you have any questions, please contact me at 702-455-1600.

Sincerely,

L. Wallenmeyer

Lewis Wallenmeyer
Director

c/o Robert W. Hall, President

Nevada Environmental Coalition, Inc.

January 6, 2010

HQ ACC/A7PS
Attn: Sheryl Parker
129 Andrews Street, Suite 337
Langley AFB, VA 23665-2769

Re: Comments re: Draft General Conformity Determination, F-35 Force Development Evaluation and Weapons School Beddown at Nellis AFB, Nevada.

Dear Gentlepeople:

I have read the Draft General Conformity Determination for the proposed F-35 Force Development Determination. On behalf of the Nevada Environmental Coalition, Inc., the NEC finds the document informative, thorough, and well done. On that basis, we have no objections or questions regarding the Draft Conformity Determination.

Respectfully submitted,

Robert W. Hall

Robert W. Hall, President
Nevada Environmental Coalition, Inc. (NEC)

Draft General Conformity Determination
for the Proposed F-35 Beddown at Nellis AFB, NV

Comment/Response Table

	Comment	***Response***
USEPA	(1) ES-3 identifies a maintenance plan requirement where there is none, i.e., absent a redesignation request, which is also not a requirement. A nonattainment area may stay nonattainment as long as it wants. However, section 175A of the Act does require a maintenance plan when a State decides to request redesignation to attainment. The subject sentence [need cite] could be revised as follows: "DAQEM and the State of Nevada have issued a commitment to include the NOx emissions in the maintenance implementation plan that DAQEM and the State intend to ~~must~~ submit pursuant to the provisions of 42 U.S.C. (section) 7505a in connection with a redesignation to attainment request under 42 U.S.C. (section) 7407(d)."	This sentence has been revised as reflected in the Final General Conformity Determination.
USEPA	(2) We note that the Air Force's reliance on the state's commitment to submit a SIP revision (effective upon the date of the final conformity determination) will trigger an 18-month deadline for submittal of a SIP revision, which is anticipated to be an 8-hour ozone maintenance plan. No suggested edit.	No edits made.
USEPA	(3) a. Noting that year 2022 is the highest PM emissions year, we expect that fugitive dust emissions (which would be highest in 2013) take into account control measures, whereas aircraft PM emissions (which would be highest in 2022) are uncontrolled. The conformity determination should clarify and confirm this, if correct.	A statement has been added to page 16 indicating that Nellis AFB would mitigate fugitive dust emissions using WRAP soil wetting guidelines.
USEPA	b. We couldn't confirm that fugitive dust emissions from tire wear and re-entrained road dust (construction worker vehicle trips and project-related commute trips), and fugitive emissions from tire wear from aircraft landings were included in emissions estimates. We suggest either adding such analysis or explaining how it is already included, if that is the case. If, for example, tire wear emissions and re-entrained road dust are not included in your MOBILE modeling results, these emissions should be estimated and added to the MOBILE results. PM numbers would certainly increase, but we do not anticipate the increase would be so large as to cause de minimis levels for PM to be exceeded.	Available air emission models (i.e., ACAM MOBILE 6.2 and EDMS do not calculate for tire/brake emissions.
USEPA	c. The General Conformity determination should identify the Clark County rules to which the project would be subject and that can thus be relied upon to reduce construction-related PM and VOC emissions. These rules include Clark County Air Pollution Regulations Section 94 - Permitting and Dust Control for Construction Activities, and Section 60.4 - Cutback Asphalts.	A sentence was added to this effect on page 5 in section 1.2.2 addressing State Requirements.
USEPA	(4) On page 22, the GC determination cites 40 CFR 51.858 as the criterion for determining conformity for CO. To the contrary, we understand the Air Force would be relying on 40 CFR 93.158(a)(4)(ii) and related Clark County DAQEM CO (area wide) modeling results from the submitted (but not yet approved) CO Maintenance Plan. If correct, then DAQEM's email (dated 8/21/09 from S. Deyo to Sheryl Parker) documenting the decision by DAQEM not to require the Air Force to conduct local CO modeling but to rely on DAQEM's own area wide CO modeling should be included along with the commitment letters at the back of the report.	Text has been revised on pages 23-24 to reflect the correct basis for the positive CO general conformity determination; the relevant correspondence has been included in Appendix B.
DAQEM	The Clark County Department of Air Quality and Environmental Management reviewed the Draft General Conformity Determination, and we concur with the finding of conformity.	Thank you for your comment.
Nevada Environmental Coalition, Inc.	On behalf of the Nevada Environmental Coalition, Inc., the NEC finds the document informative, thorough, and well done. On that basis, we have no objections or questions regarding the Draft Conformity Determination.	Thank you for your comment.
Private Citizen	Concerning the issue of basing up to 36 F-35A aircraft at Nellis Air Base, will have much more to do with noise than with the Clean Air Act. Granted, air quality is very important and will certainly come into play here, as it should!	Thank you for your comment.

12/10/09

Concerning the issue, of basing upto 34, F-35A aircraft, at
Nellis Air Base, will have much more, to do with NOISE - than with
the Clean Air Act!

Granted, Air Quality is very important, and will certainly come into
Play here, as it should!

But understand, the F-35, with it's 40,000 Lb. Thrust
Engine - is 4 times more noisy, than your standard fighter jet today!

The F-35 development, was a many nation project. Some
foreign nations are, (at least have) given serious consideration, to
Cancelling their order for these new planes, because the way they
deploy their aircraft - would make the noise factor unberable!

I think you will see one of two things take place here.
Either the aircraft will be based, out of Creech Air Base - North
of Las Vegas, or they will be Limited to a Low Power setting
around Las Vegas. Even then, they are a Problem!

You will see what I am talking about. I can only now imagine,
the Possible Legal, Letigation, issues, which will arise, related
to this deployment - if it goes thru! (ongoing health issues)

ATTACHMENT B
CORRESPONDENCE

MEMORANDUM

Department of Air Quality and Environmental Management

Lewis Wallenmeyer
Director

TO: Sheryl K. Parker, Environmental Analysis Project Manager, HQ ACC/A7PS

FROM: Stephen Deyo, Assistant Planning Manager, Clark County DAQEM

SUBJECT: Carbon Monoxide Conformity for Nellis AFB

DATE: August 25, 2009

Dear Ms. Parker,

After internal discussions, the Department of Air Quality and Environmental Management (DAQEM) has determined not to require Nellis Air Force Base to conduct local air quality modeling as part of its general conformity analysis for Carbon Monoxide (CO) for its proposed F-35 project.

DAQEM utilized a 1-kilometer grid spacing over the entire Las Vegas Valley in its UAM modeling analysis of the 8-hour, 9 ppm CO standard. This modeling, which included emissions from the F-35 project, has already been submitted to EPA as part of DAQEM's CO Maintenance Plan. In that analysis, no modeled area within the Valley is in excess of the standard. In addition, no receptor grid near Nellis Air Force Base is greater than 5 ppm. The emissions of the F-35 project are a very small portion of the CO emissions inventory for the Las Vegas Valley, and there is no indication that additional modeling or hot-spot analysis is necessary.

The technical support document of DAQEM's CO Maintenance Plan is available on our Web site:

http://www.accessclarkcounty.com/depts/daqem/aq/planning/Documents/CO/COSIP2008/CO_MaintenacePlanTechnicalSupportDocument.pdf

Please note figure 3-3 on page 3-5 in particular for predicted 8-hour maximum CO concentrations (ppm) in the Las Vegas Valley, inclusive of area controlled by Nellis Air Force Base.

Please contact me if you have any questions.

Stephen Deyo
Assistant Planning Manager
DAQEM
(702) 455-1675

DAQEM

DEPARTMENT OF AIR QUALITY & ENVIRONMENTAL MANAGEMENT
500 S Grand Central Parkway 1st Floor · Box 555210 · Las Vegas, NV 89155-5210
(702) 455-5942 · Fax (702) 383-9994
Lewis Wallenmeyer Director · Tina Gingras Assistant Director

October 20, 2009

Mr. Leo M. Drozdoff, P.E., Administrator
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

Re: Commitment to Submit State Implementation Plan ("SIP") for Clark County, Nevada to Support a Conformity Determination for the Beddown of the F-35 Force Development Evaluation and Weapons School at Nellis AFB, Nevada ("Nellis F-35 Program")

Dear Mr. Drozdoff:

The purpose of this letter is to affirm that the Clark County Board of Commissioners ("Board") in its capacity as the air pollution control agency of Clark County, as designated by the Governor of the State of Nevada and in accordance with the Nevada Revised Statutes ("NRS") 445B.500, commits to submit an Ozone Maintenance SIP to the Nevada Division of Environmental Protection ("NDEP") for submittal to EPA which will accommodate all NOx emissions from the above F-35 beddown at Nellis AFB, NV. See attached emissions table from Nellis' draft conformity determination in support of the requirements of 40 CFR 93.158(a)(5)(i)(B)(5). The Clark County Department of Air Quality and Environmental Management ("DAQEM") requests that NDEP, as the Governor's designee for SIP actions, endorse and forward this commitment letter and related attachments to EPA consistent with the procedural requirements of 40 CFR 93.158(a)(5)(i)(B).

The Board has designated the director of DAQEM as the Control Officer who, along with DAQEM staff, implements and enforces the Clean Air Act ("Act") through the Clark County Air Quality Regulations, which are adopted by the authority under the Act (42 USC §§7401-7671q) and the Nevada Revised Statutes (NRS §§445B.100-.895). In addition, DAQEM is responsible for developing and implementing SIP requirements applicable to Clark County in accordance with 42 USC § 7410.

Pursuant to 40 C.F.R. § 93.158(a)(5)(i)(B) and consistent with guidance issued by the Environmental Protection Agency ("EPA") on October 19, 1994, the Board commits to adopt and to submit via the Administrator of NDEP a Maintenance Plan for ozone no later than 18 months after October 6, 2009 to the EPA. (See attached Board approval). While the Board recognizes that there is no approved SIP for ozone in Clark County at this time, the Board makes this commitment to include the Nellis F-35 Program emissions consistent with EPA Guidance on General Conformity implementation issued October 19, 1994 and the Airport General Conformity guidance issued in September 2002.

DAQEM enforces all sections of the Clark County Air Quality Regulations, as applicable. Sections 0, 12 and 55 of the Clark County Air Quality Regulations include ozone precursor regulations. Sections 0 and 12 have been submitted to EPA and approved for inclusion in the SIP, and Section 55 is locally enforceable only. As part of New Source Review Reform, Clark County will submit a comprehensive set of regulations for inclusion in the SIP which will include preconstruction and authority to operate provisions for all applicable pollutants, including ozone precursors. Clark County intends to make this submittal in 2009.

Clark County has met the attainment criteria for the 1997 Ozone Standard. The Clark County Ozone Maintenance Plan will have no additional SIP measures beyond the Clark County Air Quality Regulations and the State of Nevada's vehicle Inspection and Maintenance (I/M) Program. In developing a SIP emissions inventory for the Maintenance Plan required by 42 USC § 7505a, DAQEM will include an allowance for 200 tons per year of NOx emissions for new operations which will cover the Nellis F-35 Program emissions.

Clark County has determined that, given the nature of the Nellis F-35 Program, no mitigation measures will be required by the Air Force for this commitment to be fulfilled. The emissions from the Nellis F-35 Program will be accounted for in the SIP that Clark County will prepare for the Maintenance Plan, which will be submitted no later than 18 months after October 6, 2009.

Please contact Stephen Deyo at (702) 455-1675 or DEYO@co.clark.nv.us should you have any questions on this matter.

L. Wallenmeyer

Lewis Wallenmeyer
Director

Attachments

cc: Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health (SAF/IEE)

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

November 16, 2009

Laura Yoshii
Acting Regional Administrator
OAR-1, USEPA Region IX
75 Hawthorne Street
San Francisco, CA 94105

Dear Ms. Yoshii:

On behalf of Governor Gibbons, as his appointed designee, the Nevada Division of Environmental Protection (NDEP) is forwarding the enclosed commitment letter with attachments from the Clark County Department of Air Quality and Environmental Protection (DAQEM). Through the enclosed letter DAQEM is affirming that the Clark County Board of Commissioners has authorized DAQEM to prepare and submit an ozone maintenance plan for U.S. EPA approval which will accommodate all NO_x emissions from the F-35 Beddown project at Nellis Air Force Base. This method of demonstrating general conformity for this project with the Nevada state implementation plan was developed with U.S. EPA Region IX assistance.

If you should have any questions about this submittal or require additional clarification, please refer to the enclosed letter from DAQEM for contact information.

Sincerely,

Leo M. Drozdoff

Leo M. Drozdoff, P.E.
Administrator

Enclosure

cc: Robin Reedy, Chief of Staff, Office of the Governor
Allen Biaggi, Director, DCNR
Colleen Cripps, Deputy Administrator, NDEP
Michael Elges, Chief, Bureau of Air Pollution Control, NDEP
Greg Remer, Chief, Bureau of Air Quality Planning, NDEP
Lewis Wallenmeyer, Director, DAQEM, Clark County
Tina Gingras, Assistant Director, DAQEM, Clark County
Jefferson Wehling, EPA Region IX, ORC-2 (w/enclosure)
Karina O'Connor, EPA Region IX, AIR-2 (w/enclosure)

Certified Mail No. 7008 1140 0004 4031 2485

APPENDIX G
COMMENTS AND RESPONSES ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX G
COMMENTS AND RESPONSES ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

1.0 INTRODUCTION

This section contains comments on the draft EIS and responses to those comments. Comments were received from the general public, agencies, and the Consolidated Group of Tribes during the comment period that began on April 4, 2008 and ended on May 19, 2008. In accordance with NEPA, public and agency comments were reviewed and incorporated into the EIS. These public and agency comments will be used by the decisionmaker in determining whether or not to implement the Proposed Action.

2.0 COMMENT AND RESPONSE PROCESS

Comments on the Draft EIS were generated through written correspondence during the public comment period. The following process was used for reviewing and responding to these comments:

- All comment letters and testimony were reviewed and assigned a unique number.
- Within each comment letter or testimony, substantive comments were identified and bracketed. These bracketed comments were then reviewed by appropriate staff or resources specialists and provided an individual response. Three guidelines were used for determining substantive comments.
    1. The proposed action, alternatives, or other components of the proposal were questioned.
    2. The methodology of the analysis or results was questioned.
    3. The use, adequacy, and/or accuracy of data were questioned.
- The individual bracketed comments were assigned a response code corresponding to a specific response. These responses (and codes) were organized in numerical order. The responses to comments appear in the response section of this volume.
- Due to their similarity, some comments were assigned the same response.

3.0 LOCATING RESPONSES TO COMMENTS

All comments letters were given a response number. Response numbers are printed next to one or more bracketed areas in the left margin of the comment letters. Because of the limited number of comments, responses were not grouped by resource area. However, they are generally ordered by public, agency, and Consolidated Group of Tribes comments. Responses are found in the response section following the comments.

ATTACHMENT A

Comments

MS. SHERYL PARKER

THANK YOU FOR THE BROCHURE ON THE F-35 DEVELOPMENT EVALUATION AND WEAPONS SCHOOL BREAKDOWN

— — — — — —

I HOPE YOU WILL ADVERTISE IN ADVANCE – TO LET AS MANY PEOPLE KNOW AS POSSIBLE (HERE IN ALAMO)

I WILL MAKE THE MEETING IN $\boxed{\text{ALAMO}}$ – I HOPE (MESSAGE)

P-1

c/o Robert W. Hall, President

Nevada Environmental Coalition, Inc.

April 7, 2008

Ms. Sheryl Parker
F-35 FDE and WS Project Manager
HQ ACC/A7PP
129 Andrews Street, Suite 122
Langley AFB, VA 23665-2769

Comments re: F-35 Force Development Evaluation and Weapons School Beddown Draft Environmental Impact Statement (EIS).

Dear Ms. Parker:

The purpose of an EIS is to inform the public and other government agencies regarding a major environmental impact. We believe that the F-35 draft EIS accomplishes that goal.

Nellis AFB has been in the Valley for a long time. The Air Force has expressed concerns throughout the years regarding zoning and land use encroachment that was not wise. With the F-35, the "rubber has now hit the road." Air Force concerns have become a reality.

The Nevada Environmental Coalition, Inc. ("NEC") takes the position that the impact on the community of Air Force operations is as much a zoning and land use issue as it is an environmental issue. With the reality of the current war, the NEC will not comment further while at the same time, we urge the relevant agencies to deal with the reality of Air Force operations in a small valley area that lacks zoning and land use foresight. P-2

Respectfully submitted,

Robert W. Hall

Robert W. Hall, President,
Nevada Environmental Coalition, Inc. (NEC) and as an individual

NEC

April 5, 2008

HQ ACC/A7PP
129 Andrews St #122
Langley Air Force Base, Virginia 23665-2769
Attn: Ms. Sheryl Parker

Dear Ms. Sheryl Parker,

We are responding to the legal notice in our local paper regarding the F-35 being bedded down at Nellis AFB in Las Vegas Nevada.

WE ARE VENOMOUSLY OPPOSED TO THIS F-35 BEDDOWN.

Our home is located approximately 160 miles north of Nellis AFB. We are 8 miles north of the little town of Caliente. When we built our dream home in 1999, it was a peaceful location to retire. When Nellis announced they were bringing the F-22 to the base, we went to the public hearings. We protested the arrival of the F-22 because we were told there would be increased sonic booms. Increased is putting it mildly! We were told by Mike Estrada at the public affairs office, that if we had trouble with sonic booms, to call him and he'd take care of it. Naïve us. We indeed got the sonic booms and called Mike for his help. He agreed "Yup, those were sonic booms alright." Needless to say, he didn't make them go away. HE LIED to us. P-3

There isn't a window frame in our new home that isn't cracked. We recently have started patching cracks, hammering in wallboard nails that have popped, and re-painting our home from the damage from the sonic booms. Wednesday, April 2, at approximately 5 pm, there was a horrific sonic boom that cracked a stained glass window in one of our kitchen cupboards. That too will have to be fixed at our expense. There is only a 100 foot ceiling above our homes. No, I am not exaggerating. It's only 100 feet. The abuse we are forced to endure also extends to our pets. On April 2, we had had several sonic booms that morning. Our dog was trembling and beside herself. I called Nellis and asked if they were going to be sonic booming us again in the afternoon, because if they were, I needed to drug our dog to prevent her terror. We only had the one boom that broke the stained glass window. It was like it was retribution for complaining earlier. The air force should be so proud! P-4 P-5

We have an elderly neighbor, 89 years old, who lives by herself. After so many of your sonic booms, she is forced to go up a ladder and hammer in the nails on the outside of her home that have been worked loose. She is too independent to ask for our help. The air force should be so proud!

There are documented cases where the fighter pilots "buzz" the herds of livestock in the area, forcing the ranchers to gather the herds up and calm them down. The arrogant pilots think this is really funny as they have tipped their wings at the ranchers or circle around P-6

and do it again. The air force should be so proud!

If we have this much trouble with the F-22, we are REALLY dreading the arrival of the F-35. We are very tired of the rudeness, arrogance, disrespect, and the bullying we must endure from the air force. Needless to say, there aren't any positive adjectives to use when speaking of Nellis. We have all talked to Nellis to no avail. We have spoken with the base commander, the wing commander, Mike Estrada, and others. They just don't care. Mike Estrada's salary is a waste of the tax payers money, as there aren't any good public relations with rural Nevada. It is a real shame when we are abused by the very government that is supposed to protect our rights. It is a shame our tax dollars are used to support the air force, that in turn damages our houses, and we have to pay for repairs.

Please, Please, Please don't send the F-35 to Nellis and give the bullies more power to further destroy our homes and what used to be a peaceful way of life.

We would really appreciate a response from you, so we know someone at least read our letter. Thank you. P-7

Sincerely,

Richard & Korla Ward

Richard & Korla Ward

Department of Comprehensive Planning

500 S Grand Central Pky • Ste 3012 • Box 551741 • Las Vegas NV 89155-1741
(702) 455-4314 • Fax (702) 385-8940

Barbara Ginoulias, Director • Rod Allison, Assistant Director

May 15, 2008

HQ ACC/A7PP
129 Andrews St., Ste 122
Langley AFB, VA 23665-2769
ATTN: Ms. Sheryl Parker

SUBJECT: F-35 FORCE DEVELOPMENT EVALUATION (FDE) AND WEAPONS SCHOOL (WS) BEDDOWN DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Dear Ms. Parker,

Clark County's Department of Comprehensive Planning has reviewed this draft EIS.

The Department notes that the proposal would result in increased noise levels affecting a greater number of people and an expanded live ordnance loading area.

This suggests to us that an updated Air Installation Compatible Use Zone (AICUZ) study, or similar action, will be conducted if the proposal moves forward. Timely consideration of AICUZ recommendations can minimize potential incompatible land uses. In the past, our agencies have worked closely together to incorporate AICUZ recommendations into the County's regulations. Our hope is to continue this successful collaboration in the future. A-1

If you have any questions please feel free to contact me.

Sincerely,

Nancy A. Lipski

Nancy A. Lipski, AICP
Planning Manager

NL\JW\dk

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

May 22, 2008

Ms. Sheryl Parker
HQ ACC/A7PP
129 Andrews Street
Suite 122
Langley AFB, VA. 23665-2769

Subject: Draft Environmental Impact Statement (DEIS) F-35 Force Development Evaluation and Weapons School Beddown (CEQ# 20080122)

The U.S. Environmental Protection Agency (EPA) has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act. Our comments are provided in accordance with the EPA-specific extension to the comment deadline date from May 19, 2008 to May 22, 2008, granted by Michael Estrada, Public Affairs Office, Nellis Air Force Base on May 7, 2008.

We have rated the DEIS as Environmental Concerns – Insufficient Information (EC-2) (see enclosed "*Summary of Rating Definitions*") due to our concerns with the direct and cumulative increase in noise that would disproportionately affect minority and low-income populations in the vicinity of Nellis Air Force Base (Nellis AFB). A-2

We appreciate the opportunity to review this DEIS. When the FEIS is released for public review, please send one hard copy and one CD ROM to the address above (mail code: CED-2). If you have any questions, please contact me at (415) 972-3846 or Laura Fujii, the lead reviewer for this project. Laura can be reached at (415) 972-3852 or fujii.laura@epa.gov.

Sincerely,

For Connell Dunning
Nova Blazej, Manager
Environmental Review Office

Enclosure:
Summary of EPA Rating Definitions
Detailed Comments

cc: Honorable Michael L. Montandon, Mayor, City of North Las Vegas
Mr. Mark Morse, BLM-Las Vegas Field Office

SUMMARY OF EPA RATING DEFINITIONS

This rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the EIS.

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

ADEQUACY OF THE IMPACT STATEMENT

Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

EPA DETAILED DEIS COMMENTS F-35 FORCE DEVELOPMENT EVALUATION AND WEAPONS SCHOOL BEDDOWN, NELLIS AFB, NV, MAY 22, 2008

Mitigation of Noise Effects

Provide additional specific commitments to mitigate adverse noise effects. The beddown of 36 F-35 fighter aircraft at Nellis Air Force Base (Nellis AFB) would expose an additional 13,917 persons and 11 more sensitive receptors, including 7 more schools, to noise levels of 65 Day-Night Average Sound Level (DNL) or greater (p. 2-45, p. 4.8-2). The Federal Interagency Committee on Urban Noise states that noise exposure greater than 65 DNL is considered generally unacceptable over public services or residential, cultural, recreational, and entertainment areas (p. 4.3-1). Further, this increase in noise would disproportionately affect minority and low-income populations, affecting 42% minority and 16% low-income populations of the total population in the vicinity of Nellis AFB (p. 4.8-1).

The Air Force commits to continued use of existing noise abatement procedures which include operational measures and continued coordination with Clark County on land use planning (p. 3.3-8). The DEIS acknowledges that there would be a noticeable increase in noise complaints and levels of annoyance from residents adjacent to the base (p. 4.3-3). EPA is concerned with the increased noise levels over residential areas, sensitive receptors, and disproportionate effects on environmental justice communities. Our concern is heightened given the cumulative effects of the doubling of historical noise effects caused by the 2002 to 2008 beddown of 17 F-22 Raptor aircraft at Nellis AFB (1999 DEIS F-22 Aircraft Force Development Evaluation and Weapons School Beddown). A-3

Recommendation:

We recommend the FEIS include a list of additional specific commitments to mitigate the adverse noise effects of the F-35 beddown and the cumulative impacts of the F-35 beddown in combination with the F-22 beddown. Mitigation options include additional public involvement in noise abatement decisions, education programs on noise attenuation measures, assessments of the adequacy of existing sound proofing, and funding and technical assistance to sensitive receptors and communities to reduce the adverse noise levels.

Provide a public outreach and education program to inform recreation visitors about noise effects. In addition to the increase in subsonic noise, there would be an increase of sonic booms by 2 to 4 per month within the Desert Military Operations Area (MOA)/Elgin airspace and Desert MOA/Coyote airspace. The average number of sonic booms per month in these MOAs is 35 and 12 sonic booms, respectively, under a 350,000 sortie-operations scenario (p. 4.6-6). The Key Pittman Wildlife Management Area, White River Petroglyphs, Beaver Dam State Park, and Ella Mountain recreation areas are under these MOAs (Figure 3.6-6, p. 3.6-20). Recreation visitors would be exposed to these sonic booms which may be perceived as annoying in a wilderness setting. A-4

Recommendation:
Given the increased number of sonic booms and the significant increase in population in Clark and Lincoln Counties (p. 5-5), we recommend the Air Force and Nevada Test and Training Range (NTTR) implement a public outreach and educational program about aircraft operations and their associated noise effects. For instance, we recommend working with the appropriate land use managers to develop interpretive signs for the affected recreation areas that explain aircraft operations and associated noise effects and sonic booms.

Pollution Prevention

Salvage, recycle, and reuse demolition waste. Use materials with recycled content. The F-35 beddown would require construction of new facilities, and alteration and demolition of existing facilities (p. 2-31).

Recommendation: A-5
Maximize resource conservation and pollution prevention in accordance with Executive Order 13148 Greening the Government Through Leadership in Environmental Management. We recommend the project design include the salvage, recycling, and reuse of the demolition waste. We also recommend new construction maximize the use of materials with recycled content. Useful tools and resources may be found at http://www.epa.gov/industrialmaterials/ and in EPA's March 2008 Industrial Materials Recycling: Tools and Resources Guide which can be obtained from EPA's Industrial Materials Recycling Program, U.S. EPA's Office of Solid Waste (MC 5306P), Washington, DC, 20460.

Mayor
Michael L. Montandon

Council Members
William E. Robinson
Stephanie S. Smith
Shari Buck
Robert L. Eliason

City Manager
Gregory E. Rose

CITY OF
NORTH LAS VEGAS

Your Community of Choice

Office of the City Manager
2200 Civic Center Drive • North Las Vegas, Nevada 89030-6307
Telephone: (702) 633-1005 • Fax: (702) 633-1339 • Fax: (800) 326-6868
www.cityofnorthlasvegas.com

15 May 2008

Ms. Sheryl Parker
F-35 FDE and WS EIS Project Manager
HQ ACC/A7PP
129 Andrews Street, Suite 122
Langley AFB, Virginia 23665-2769

RE: Comments on the F-35 Force Development Evaluation (FDE) and Weapons School (WS) Beddown at Nellis Air Force Base Draft Environmental Impact Statement (EIS)

Dear Ms. Parker:

The City of North Las Vegas (CNLV) appreciates this opportunity to comment on the Draft Environmental Impact Statement (DEIS) conducted by the Department of the Air Force regarding the proposed F-35 Beddown at Nellis Air Force Base (AFB).

The F-35 DEIS analyzed two alternatives including the "No Action" alternative. As stated in the DEIS, the Department of the Air Force's proposed action is to implement the FDE program and WS for the F-35 on the Nellis Air Force Base (AFB). The proposed action will involve basing 36 F-35 aircraft at Nellis AFB arriving between 2012 and 2022, construct, demolish, or modify base facilities to support F-35 programs, conduct an additional 17,280 annual airfield operations at Nellis AFB by 2022, and an additional 51,840 annual sortie-operations in the Nevada Test and Training Range (NTTR) and, practice ordinance delivery on approved targets and release chaff and flares in approved airspace.

The City's main concern is with the increase in acreage exposed to noise of 65 DNL and greater by 2022 associated with the Beddown of the F-35. This is projected to be an increase of 85 percent or an additional 15,333 acres as stated in the report. A-6

The City of North Las Vegas was recognized as the fasted growing large city in the country last year and as such we are concerned for the health, safety, and welfare of our citizens. Land Uses displayed on Figure 4.6-1, particularly to the west of Nellis AFB, do not reflect those of the CNLV Land Use Plan adopted in 2006, showing that a large portion of lands affected by projected noise contours are classified as *Open* rather than their current classification of residential, commercial, industrial, etc. A copy of the City's Land Use Plan is enclosed with this letter. A-7

Another issue we wish to point out is that the City of North Las Vegas has grown from 115,488 in 2000 to 215,026 as published in the 2008 NLV Community Report. Since the DEIS report uses the 2000 census as a basis for the number of people affected by the new noise contours, it may be inaccurate in recognizing the current number of people potentially affected by the Beddown of the F-35. A-8

Since the proposed Beddown of the F-35 will contribute greater noise levels to more residents and land within North Las Vegas, we ask to be kept current with the Nellis AFB noise contours. This will enable the City to keep our codes current to address appropriate land uses and regulations within the new noise contours. A-9

One final concern relates to the additional fuel emissions expected by the Beddown of the F-35 and the potential that this may have adverse effects on the air quality and sensitive species lying within North Las Vegas. A-10

Thank you for the opportunity to review and comment on the F-35 Beddown at Nellis Air Force Base. Should you have any questions, please do not hesitate to contact Maryann Ustick, Assistant City Manager, at 702 633-2655.

Sincerely,

Gregory E. Rose
City Manager

Enclosure: CNLV Land Use Plan (November 2006)

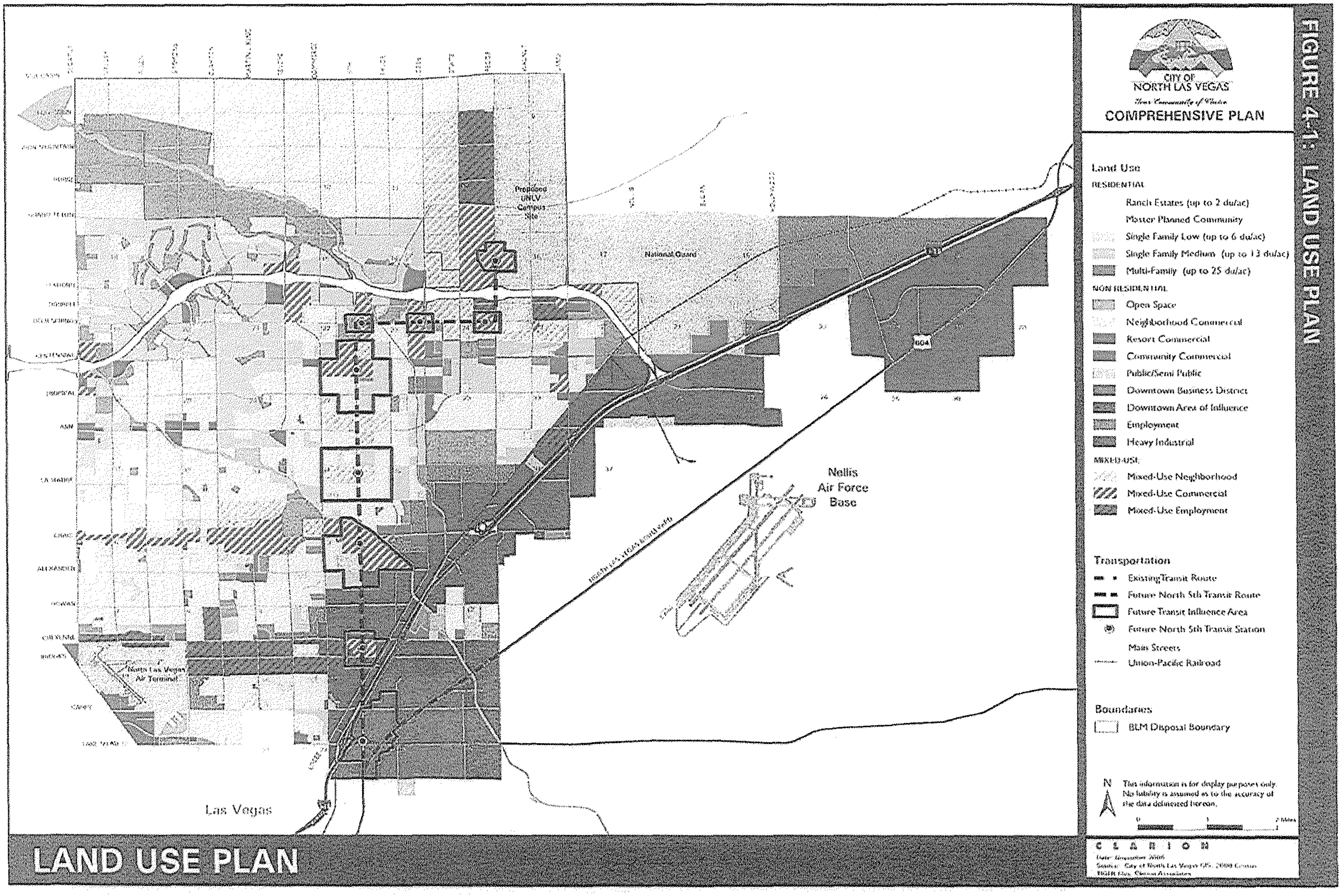

FIGURE 4-1: LAND USE PLAN

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Pacific Southwest Region
1111 Jackson Street, Suite 520
Oakland, California 94607

IN REPLY REFER TO:
ER 08/387

Filed Hardcopy

15 May 2008

Ms. Sheryl Parker
F-35 FDE & WS EIS Project Manager
HQ ACC/A7PP
129 Andrews St, Suite 122
Langley AFB, VA 23665-2769

Subject: Review of the Draft Environmental Impact Statement (DEIS), for Nellis Air Force Base, F-35 Force Development Evaluation and Weapons School Beddown, NV

Dear Ms. Parker:

The Department of the Interior has received and reviewed the subject document and has no comments to offer. A-11

Thank you for the opportunity to review this project.

Sincerely,

Patricia Sanderson Port
Regional Environmental Officer

cc:
Director, OEPC

Department of
Air Quality & Environmental Management

500 S Grand Central Parkway 1st Fl • Box 555210 • Las Vegas NV 89155-5210
(702) 455-5942 • Fax (702) 383-9994

Lewis Wallenmeyer, Director • Alan Pinkerton, Assistant Director • Tina Gingras, Assistant Director

May 15, 2008

HQ ACC/A7PP
129 Andrews St., Ste. 122
Langley AFB, VA 23665-2769
ATTN: Ms. Sheryl Parker

Re: F35 Development Evaluation (FDE) and Weapons School (WS) Beddown Draft Environmental Impact Statement (EIS)

Dear Ms. Parker:

The Clark County Department of Air Quality and Environmental Management (DAQEM) reviewed the subject Environmental Impact Statement (EIS). The proposed project is located within Hydrographic Area (HA) 212, which is designated nonattainment for the following criteria pollutants: particulate matter less than 10 microns in diamater (PM_{10}), carbon monoxide (CO), and ozone (O_3). DAQEM submits the following comments for your consideration to further clarify several points in the EIS.

DAQEM is designated by the Clark County Board of County Commissioners (BCC) as the air pollution control agency for Clark County. The department ensures compliance with federal, state, and local air quality regulations, in addition to preparing state implementation plans.

The Nevada Division of Environmental Protection (NDEP) has jurisdiction over air quality programs throughout the state, except in the counties of Washoe and Clark. However, NDEP retains jurisdiction of fossil fuel-fired units that generate steam for electrical production only. NDEP implements state and federal programs relating to ambient air monitoring, mobile sources, smoke management, planning, regional haze, increment tracking, and nonattainment areas. NDEP has adopted ambient air quality standards; however, attainment/nonattainment status is determined by compliance with the NAAQS prescribed by the U.S. Environmental Protection Agency (EPA).

After this EIS was drafted, regulatory changes impacted Clark County's O_3 nonattainment status. On December 22, 2006, the U.S. Court of Appeals for the District of Columbia Circuit vacated the O_3 Phase I Implementation Rule, which classified portions of Clark County as "basic" nonattainment under Subpart I of the Clean Air Act. The court remanded the rule to EPA for corrective action. EPA has not yet reissued the rule, leaving Clark County designated nonattainment for O_3 but unclassified. EPA intends to promulgate a new rule to reclassify the Subpart I areas in the fall of 2008 and finalize the rule in the first half of 2009. However, EPA issued a more stringent O_3 standard on March 12, 2008. Clark County exceeds the new standard and anticipates a nonattainment designation in 2010. A-12

In Section 2.2.4, "Other Regulatory Requirements," you refer to a base-wide Title V permit. In April 2007, the consolidated New Source Review (NSR) permit was issued to the U.S. Air Force (99CES/CEV). However, the Part 70 Title V permit has not been issued. A-13

In addition to the PSD Class 1 areas mentioned, the Grand Canyon National Park, categorized as a Class 1 Area, is within 100 km of Nellis Air Force Base. A-14

DAQEM appreciates the opportunity to review the proposed project. If you have any further questions, please contact me at 702-455-1600.

Sincerely,

L. Wallenmeyer

Lewis Wallenmeyer
Director

JIM GIBBONS
Governor

STATE OF NEVADA

ANDREW K. CLINGER
Director

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
(775) 684-0222
Fax (775) 684-0260
http://www.budget.state.nv.us/

May 13, 2008

Ms. Sheryl Parker
US Air Force
Air Combat Command
HQ ACC/A7PP
129 Andrews Street
Suite 122
Langley AFB, VA 23665-2769

Re: SAI NV # **E2008-419** Reference:

Project: **F-35 Deployment at Nellis DEIS**

Dear Ms. Sheryl Parker:

The following agencies support the above referenced document as written: A-15
State Historic Preservation Office

This constitutes the State Clearinghouse review of this proposal as per Executive Order 12372. If you have questions, please contact me at (775) 684-0209.

Sincerely,

Krista Coulter
Nevada State Clearinghouse

CONSOLIDATED GROUP OF TRIBES AND ORGANIZATIONS'

DOCUMENT REVIEW COMMITTEE'S ASSESSMENT

OF THE

F-35 FORCE DEVELOPMENT EVALUATION AND

WEAPONS SCHOOL BEDDOWN ENVIRONMENTAL

IMPACT STATEMENT

(DRAFT FINAL)

BY

UNITED STATES AIR FORCE

AIR COMBAT COMMAND

MAY 2008

INTRODUCTION

In 1996, the Consolidated Group of Tribes and Organizations (CGTO) American Indian Writers Subgroup began participating in formal reviews and writing in Environmental Impact Statement for the U.S. Department of Energy in their Site-wide Environmental Impact Statement followed by the Nellis Air Force Base Legislative Environmental Impact Statement. As a result of this dynamic approach, the Nellis Air Force Base elicited the assistance of the CGTO's who appointed its Document Review Committee (DRC) comprised of individuals who would develop and review the NAFB Cultural Resources Management Plan. This effort became the foundation for expanding the systematic consultation model with Native Americans while concurrently allowing the Air Force to fulfill its mission. Integral to this approach is the DRC's consideration and expression that all areas and resources important and/or sensitive to Indian people must be considered and evaluated by the Air Force.

The criterion used by the DRC consists of five distinct areas of consideration to provide uniformity in developing collective responses. The first consideration is the nature of the document and when dealing with specific projects consideration is focused on the Area of Potential Effect and the resources located within close proximity that may be inadvertently disturbed. The second consideration is the impact(s) to cultural resources including historic and/or religious sites. The third area of evaluation is the systematic examination of the archaeological and anthropological records used as a basis of their findings. The fourth consideration is the corresponding survey findings that may be used to potentially clear the area of any important cultural resources. The last important aspect is the appropriateness and justification of the proposed undertaking. As a result of the efforts of the CGTO and the DRC, the Air Force has recognized the important contributions of the group and dedicated a large percentage of its Cultural Resources Management Program funding to support its Native Program budget and the efforts of the Document Review Committee.

On April 9, 2008 the U.S. Department of Defense–Nellis Air Force Base notified the Spokesperson of the Consolidated Group of Tribes and Organizations and Coordinator of

the Document Review Committee that the F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement would be forthcoming.

In order to expedite the review, the draft EIS was provided to the DRC Coordinator for an initial review followed by the other 4 members of the committee that are appointed by the Consolidated Group of Tribes and Organization (CGTO), and represents the four ethnic groups with cultural and historic ties to the Southern Nevada area and consisting of the Western Shoshone, Southern Paiute, Owens Valley Paiute, Mojave representatives. The charge of this committee requires that each member agree to the terms of the review and provide a thorough evaluation of the documents within an established timeframe. The review time established for this document was 30 days from receipt of the report.

PROJECT DESCRIPTION

This report is intended to provide a synthesis of information on behalf of the CGTO's Document Review Committee as it relates to the F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement developed by the United States Air Force Air Combat Command.

FINDINGS

Using the review criteria adopted by the DRC, comments were developed for consideration by the U.S. Air Force Air Combat Command prior to finalizing any decisions relating to the Record of Decision and potential implementation of the preferred alternative described in this document. Contained within this review are specific comments corresponding to each of the areas that were identified by the DRC that have been provided using page and paragraph numbers where appropriate. All responses have attempted to provide suggestions and/or comments that may provide insight from a cultural perspective.

List of Acronyms and Abbreviations – This listing identifies Native American Program (NAP) however integral to this program and responsible for various reviews including this document is the Consolidated Group of Tribes and Organizations (CGTO) which is not identified in this listing.

General Comment: Since the CGTO has been instrumental in assisting the Air Force in complying with various federal mandates relating to cultural resources, it is recommended that the listing be expanded to include the CGTO. CGTO-1

1.0 Purpose and Need for the Action

Page 1.4 (1st Paragraph) - The text indicates that the Air Force must ensure that this document was developed in accordance with NEPA. As such, NEPA identifies that each federal agency should analyze the environmental effects, including human health, social effects of federal action, including effects on minority populations, low income populations and Indian Tribes, when such analysis is required by NEPA.

Further, mitigation measures identifies as part of an Environmental Impact Statement should whenever feasible, address significant and adverse environmental effects of populations on minority populations, low income populations and Indian Tribes.

Each federal agency must provide opportunities for effective community participation in the NEPA process including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents and meetings.

Executive Order 12898 Federal Action to Address Environmental Justice in Minority Populations and Low income Populations provides each federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income

populations . This Order makes its clear that its provision applies full to programs involving Native Americans.

2.0 Description of the Proposed Action and Alternatives

Page 2-39 (Last Paragraph) Government-to-Government Consultation – This section identifies "37 members of the Nellis AFB Native American Program who represent 17 tribes with historical ties to the land in the vicinity of NTTR …." There is also reference to the Document Review Committee which was a standing committee of the Consolidated Group of Tribes and Organizations.

Recommendation: The text is not clear that the Document Review Committee serves at the pleasure and is appointed by the Consolidated Group of Tribes and Organizations (CGTO). Therefore the text should be expanded to reference the CGTO who interacts with and is an integral part of the NAFB Native American Program (NAP). CGTO-2

Secondly, the text indicates that the tribal representatives who participate in the NAP were notified at the initiation of the project as a part of an ongoing government-to-government consultation between the Nellis AFB and these tribes.

General Comment: It should be noted that the prior to publication of the Draft EIS, the Air Force issued a Notice of Intent (NOI) in the Federal Register on August 23, 2004. During an annual Tribal Meeting sponsored by the NAFB, a brief overview announcing that an EIS would be developed however there was no mention specifying when the document would be released which turned out to be 4 years later. To this end, this effort was viewed by tribal representatives merely as an informal announcement of future work. It should be noted that a total of five scoping meetings were held from September 13-17, 2004 in Carson City, Alamo, Pioche, Pahrump and Las Vegas. No effort was made to hold a similar meeting providing an equal opportunity for tribal representatives to speak directly with scientists, engineers and military personnel involved in this project

General Recommendation: It is recommended and noted that opportunities should be made available for tribal representatives to participate fully in the NEPA process by participating in meetings with tribal governments to maintain and enhance government-to-government relations. CGTO-3

Page 2-40 2.4.3 Public Involvement Process - Each federal agency must provide opportunities for effective community participation in the NEPA process including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents and meetings.

Executive Order 12898 Federal Action to Address Environmental Justice in Minority Populations and Low income Populations provides each federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations . This Order makes its clear that its provision applies fully to programs involving Native Americans.

Page 2-45 Description of Proposed Action and Alternatives - Environmental Justice. The text notes that an additional 7 schools would be exposed to noise levels of 65DNL or greater; however, safety risks to children would not be increased.

CGTO-4

General Comment: The schools that are evaluated do not include the Duckwater Elementary School administered by the Duckwater Shoshone Tribe nor does it consider the Timbisha Shoshone Homelands or the Moapa and Las Vegas Paiute Tribes. Further, in the 1996 NAFB Legislative EIS, the CGTO had written text regarding Dead Air, a cultural anomaly or the perceived risks associated with sonic booms. It is recommended that the consideration be given to previous text that was developed by the CGTO and specific to Air Force lands described in this EIS.

Page 2-46 Cultural Resources – (NTTR) – The term "Traditional Cultural Resources" is incorrect and confusing. Within the body of the text this term is used however there is no definition provided. CGTO-5

Recommendation: If the intent of this term is to comply with National Park Service Bulletin 38 which defines "Traditional Cultural Properties" then the text should be in the used consistently and in the proper context and referenced accordingly.

Page 2-46 Cultural Resources – (NTTR) – The text indicates that noise and sonic booms are unlikely to affect archaeological sites or architectural resources. It is further states that an increase of 1 to 4 sonic booms per month in the airspace nits could be considered to affect setting of sacred and traditional use areas, but not adversely. This method does not evaluate the actual and perceived damages to these important areas.

Recommendation: The text is not consistent with Aircraft Noise Assessment Methods described in 3.0Affected Environment and should be modified to clarify the implied conclusions identified by the authors. CGTO-6

3.0 Affected Environment

Page 3.3-2 Aircraft Noise Assessment Methods – The text describes basic methodologies in general terms that are used in assessing aircraft noise. Primarily the model focuses on how sound is measured and it affects on people and the natural environment.

General Comment – While the text provides a summary of the conclusions drawn using the methodologies, there appears to be no correlation between the actual and/or perceived human health affects and the possible implications to cultural resources and other sensitive or traditional use areas. CGTO-7

Page 3.3-3 Assessing Aircraft Noise Effects – The text describes two studies that correlate factors influencing annoyance and emotional values. While there is some consideration given to general feelings or beliefs relating to the perceived effects of noise on health or fear associated with the noise, there are cultural variable and perceptions that are not considered in this model.

General Recommendation – The text and/or model referenced should be expanded to incorporate cultural aspects to the perception and impacts relating to aircraft noise. CGTO-8

Page 3.5-8 Bird/Wildlife-Aircraft Strike Hazard – The text identifies "Class B Mishaps" and "Class C Mishaps" without definition or explanation. In the previous paragraph, "Class A Mishaps" is defined and makes it easier for the reader to understand.

General Comment – The text should be modified to provide similar definition and delineation between the different levels or categories of Mishaps. CGTO-9

Page 3.3-10 Figure 3.3-3 Baseline Noise Levels at NTTR - The map illustrates various communities adjacent to the Reveille and Desert MOA but does not identify various tribal lands including the Timbisha Tribal Homelands, Duckwater Shoshone Tribe, Moapa Paiute Tribe and the Las Vegas Paiute Tribe.

General Comment – The map should be modified to illustrate the various tribal lands within close proximity to the MOAs as part of its continued commitment to recognizing and considering the effects associated with military activities on those tribal lands near or within the MOAs. CGTO-10

Page 3.3-14 Figure 3.3-4 Baseline Supersonic Noise Levels and Sonic Booms at NTTR – The map illustrates various communities adjacent to the Reveille and Desert MOA but does not identify various tribal lands including the Timbisha Tribal Homelands, Duckwater Shoshone Tribe, Moapa Paiute Tribe and the Las Vegas Paiute Tribe.

General Comment – The map should be modified to illustrate the various tribal lands within close proximity to the MOAs as part of its commitment to recognizing and considering the effects associated with military activities on those tribal lands near or within the MOAs. CGTO-11

Page 3.5-4 Aircraft Mishaps – The text states that in the last 5 years, there have been two Class A aircraft accidents on the Nellis AFB will over 340,000 airfield operations have been conducted.

General Comment – It appears that the text delineates the differences between Aircraft mishaps and Mishaps involving aircraft that are solely attributed to Bird/Wildlife although the same Grade Classification is used for both. Since it is assumed that the 5 mishaps were not caused by bird/wildlife as delineated on page 3.5-8 (Bird/Wildlife-Aircraft Strike Hazard) it is suggested that a special notation be provided to make the text clearer. CGTO-12

General Recommendation: The text should include an explanation describing the reason for this delineation so as not to confuse the readers.

Page 3.5-8 Bird/Wildlife-Aircraft Strike Hazard – The text indicates that 10 bird-aircraft strikes occurred in the last 10 years for the NTTR Airspace. Of these, one resulted in a Class B mishap and three in Class C mishaps. The text concludes that given the millions of miles flown at all altitudes, the occurrence and probability of bird-aircraft strikes are negligible. However it should be noted that 95% of the bird strikes occur below 3,000 AGL and are caused by migratory birds at 1,000 to 3,000 AGL.

General Comment: The text provides insufficient information about the level regarding the 10 bird-aircraft strikes and actual cost and amount of damage to the aircraft. The information provides a wide range of damage thresholds to differentiate between Classes A, B, C and E. Since these mishaps occur within the MOA, the DRC is concerned that such accidents may occur in traditional gathering areas, sacred sites or on tribal lands. CGTO-13

Moreover, the cultural implications associated with such mishaps cannot be ignored and must be culturally mitigated to include a traditional blessing of the area impacted and the remains of the bird(s) to restore proper balance.

Page 3.5-11 Wind Generators- The text describes the development and use of renewable energy, such as wind generating energy facilities that can be found in the region around NTTR. Further, the Airspace Manager at Nellis AFB has evaluated the locations of these generators and determined that they do not pose a threat to aircrew safety.

General Comment – The DRC is aware or a previous attempt to place a wind farm nearby on Shoshone Mountain located on the Nevada Test Site adjacent to the NTTR. This particular proposed project was determined not to be compatible with Air Force and Nevada Test Site operations. Equally important to tribal representatives are the cultural implications and siting of proposed wind generating energy facilities in or near culturally sensitive areas. Therefore, it is recommended that future evaluations conducted by the Air Force to determine compatibility of such facilities should consider cultural implications of those facilities within the MOA so that systematic ethnographic evaluations can be conducted by the Consolidated Group of Tribes and Organizations before decisions are finalized. CGTO-14

3.6 Land Use and Recommendation

Page 3.6-1 (1st Paragraph) – The text describes federal lands under the NTTR Airspace as being designated as U.S. Forest Service (USFS), BLM, USFWS, DOE, and DoD managed.

General Comment – The text inadvertently omits other lands with federal status that falls under the NTTR Airspace. CGTO-15

General Recommendation – It is recommended that the text be expanded to include Department of Interior and Tribal Governments for those tribal lands that fall within the existing MOA.

Page 3.6-15 (3rd Paragraph) – The text states that during the Resource Management Plan (RMP) process, the BLM Ely District proposed to add additional ACECs under the NTTR airspace. Management plans have not yet been developed but the Air Force and BLM are working together on those ACECs which coincide with military operations.

General Comment – The DRC is concerned with the exclusion of tribal representation in the designation of ACECs under the NTTR Airspace. CGTO-16

General Recommendation – Since 1996, the CGTO has worked collaboratively with the Air Force to effectively co-managed important cultural resources impacted by military operations. It is recommended that the Air Force facilitate dialogue between federal agencies that designate ACECs under NTTR Airspace.

Page 3.6-16 (Table 3.6-7) Wilderness Areas and Wilderness Study Areas Underlying NTTR MOA Airspace – The table lists various Wilderness Areas and Wilderness Study Areas underlying the NTTR MOA. Within this listing are several significant and culturally sensitive areas that can be adversely impacted by military operations. CGTO-17

General Comment – The Air Force should strive to discuss these cultural implications with the CGTO so that systematic analysis can be conducted to minimize possible damage or infringe on the religious practices of American Indians.

Page 3.6-17 – Nevada Test and Training Range (2nd Paragraph) – The text identifies noise levels on proposed wildness areas under the NTTR Airspace.

General Comment – There is no analysis of noise levels to Indian Reservation lands adjacent to the MOA nor is it mentioned. No consideration is provided of those special areas designated by tribal governments as Wilderness Areas or Wilderness Study Areas.

CGTO-18

General Recommendation – Further analysis should be conducted to determine those tribal governments that may have designated special areas as tribally designated Wilderness Areas or Wilderness Study Areas to properly address those areas.

Page 3.6-19 Nevada Test and Training Range (3rd Paragraph) – The text indicates that within portions of the DNWR (managed by the USFWS) Bighorn Sheep, elk, mule deer, antelope, and upland game (grouse, chukar, quail, pheasant, dove, rabbits, etc.) are hunted "throughout the area"

General Comment – The terms "portions" and "throughout" appear to be contradictory and misleads the readers in thinking that hunting throughout the DNWR is permitted.

CGTO-19

General Recommendation – It is recommended that the text be modified to provide a clearer explanation of the limitations on hunting within the DWNR and the NTTR.

Page 3.6-19 (Last Paragraph) – The text references the Caliente Management Framework Plan (BLM 2000) that identifies areas where recreation use is a concern due to unique or special attributes such as botanical, zoological, geological, and paleontological values.

CGTO-20

General Comment – Clearly absence to the Framework are the cultural values that are associated within the areas that are identified in the Plan.

General Recommendation – Although "Cultural Values" are not included in the text, the EIS should make a provision to include this unique perspective that falls under the NTTR MOA airspace.

Page 3.6-20 (Figure 3.6-6 Recreation Sites and Areas under NTTR Airspace) – The map identifies selected areas including certain townships as a point of reference that are not designated Recreation Sites.

General Comment – Since selected townships are identified to aid as a point of reference the map fails to identify any tribal lands or Indian Reservations.

CGTO-21

General Recommendation – The map should be modified to include tribal lands and Indian Reservations to maintain parity throughout the document.

Page 3.6-21 (3rd Paragraph) – The text identifies selected areas including certain townships as a point of reference that is not designated Recreation Sites.

General Comment – Since selected townships are identified to aid as a point of reference the map fails to identify any tribal lands or Indian Reservations.

CGTO-22

General Recommendation – The text should be modified to include tribal lands and Indian Reservations to maintain parity throughout the document.

3.7 Socioeconomics and Infrastructure

Page 3.7-1 Population – The text while providing an explanation only focuses their analysis of Clark County and excludes other counties that will be impacted by the F-35 FDE Program.

General Comment - Since there are counties contiguous to Clark County and within those counties are four Indian Reservations that include the Duckwater Shoshone Tribe, Las Vegas Paiute Tribe, Moapa Paiute Tribe and the Timbisha Shoshone Tribe, provisions should be made to include and evaluate the socioeconomics, population and employment and earning data to properly evaluate these communities in accordance with NEPA.

CGTO-23

3.7.3 Infrastructure

Page 3.7-2 Housing – The text describes the demand for affordable quality housing in Clark County and describes housing and proposed renovation activities on NAFB.

General Comment – The text limits its description and data from Clark County and fails to identify other county demographics from adjacent counties. This approach skews the data and does not provide other information that is necessary for assessment. Additionally, there is not consideration given to tribal housing provided by the Las Vegas Paiute Tribe or operated by other Tribal Governments under the NTTR MOA. CGTO-24

General Recommendation – It is recommended that the text be expanded to include tribal housing administered by the four reservations within the NTTR MOA.

Page 3.7-3 Public Schools (2nd Paragraph) – The text describes Impact Aid as a federal program that provides funding for a portion of the education costs of U.S. Military dependents.

General Comment –The definition provided for Impact Aid is misleading and appears to be only applicable to U.S. Military dependents. Tribal members residing on Indian Reservations including the Las Vegas Paiute Tribe are eligible under Impact Aid and provide funding for a portion of education costs within Clark County. CGTO-25

General Recommendation – The definition of Impact Aid should be expanded to include American Indian Children residing on Indian Reservations.

3.8 Environmental Justice and Protection of Children

Page 3.8-1 - The text provides an overview of Executive Order 12898 and further defines Minority Populations and Low-Income Populations used in the analysis. The analysis

further considers airfield noise levels created by the proposed action for the base and vicinity but not areas near NTTR or under the airspace.

General Comment – The model for analysis only identifies the population on land areas on Nellis Air Force Base in Clark County. The model does not consider other issues beyond noise levels and distribution by age and the proximity of youth-related developments that could potentially be incompatible with the proposed action. There is no consideration given to access violations or holyland violations as identified by culturally affiliated tribal representatives. CGTO-26

Nellis AFB

Page 3.8-2 – Minority and Low-Income Populations – The text indicates that the largest percentage of lands affected by noise and residential areas are located to the west of Nellis ARB and affected under the definition of Environmental Justice.

General Comment – Since limitations are placed within close proximity to Nellis AFB, there is no mention or consideration of the Las Vegas Paiute Tribe located to the west of the NAFB. CGTO-27

General Recommendation – The text and analysis should be modified to include the Las Vegas Paiute Tribe that meets the stated definition of Minority Population.

3.9 Soils and Water Resources

Page 3.9.1 – The text limits the analysis of soil and water resources to the NAFB and all areas where proposed F-35 construction projects would occur.

General Comment – Limiting the analysis of soils and water resources only to the NAFB and where proposed F-35 construction projects occur does not adequately address other impacts including those that are culturally perceived.

General Recommendation – The analysis should be expanded to evaluate the impacts to other soils and water resources located within the MOA and potentially impacted by F-35 activities. CGTO-28

3.11 Cultural Resources

Page 3.11-1 (1st Paragraph) – The text indicates that the Air Force determines eligibility for nomination to the National Register of Historic Places.

General Comment – In subsequent text, it is noted that eligibility of sites for nomination to the National Register of Historic Places are done by the Air Force in consultation with the SHPO. CGTO-29

General Recommendation – The text should be modified to maintain consistency to include consultation with the SHPO.

Page 3.11-1 (2nd Paragraph, Last Sentence) - The text acknowledges some examples of the work of the Document Review Committee.

General Comment – The Document Review Committee is a standing committee of the Consolidated Group of Tribes and Organizations and the examples of type of reviews are limited to cultural resource reports and environmental assessments prior to SHPO reviews.

CGTO-30

General Recommendation – The text should be modified to properly state the affiliation of the DRC to the Consolidated Group of Tribes and Organizations and expand the list of examples of reviews to include study designs and writing and reviewing EIS' prior to SHPO.

3.11.1 Nellis AFB

Page 3.11-3 (3rd Paragraph) – The text indicates that that the first pine nut harvest in 65 years was conducted on NTTR as part of the evaluation process. It is further stated that no traditional resources, sacred areas or traditional use areas have been identified on the NAFB.

General Comment – The text is confusing in that it blends an activity on the NTTR in the same paragraph devoted to the Nellis AFB. Further, it is indicated that no traditional resources, sacred areas or traditional use areas have been identified on the NAFB. However, it is noted that ceremonial and sacred sites within NTTR have been identified and protected.

General Recommendation – The text should be modified to distinguish Cultural Resources identified on the Nellis AFB and the NTTR. Secondly, while the text indicates that one National Register-eligible site, a quarry is located on the base, there appears to be a discrepancy in defining this site as a traditional resource and potentially traditional use area. Lastly, the text further notes that ceremonial and sacred sites within NTTR have been identified and protect. CGTO-31

Page 3.11-4 (Last sentence) – The text states that no specific traditional resources with regard to the F-35 beddown arose during scoping.

General Comment – It should be noted that no provision was made with the Consolidated Group of Tribes and Organizations to host formal scoping consistent with other scoping meetings for the general public that were not held in a suitable location to tribal governments.

General Recommendation – The text should clarify the absence of the identification of traditional resources issues with regard to the F-35 beddown during scoping since no provision was made to elicit comments from tribal representatives. CGTO-32

Page 3.11-1 Traditional Cultural Resources (Heading v. Text) – The heading for this section is identified as "Traditional Cultural Resources" which describes "Traditional American Indian resources."

General Comment – The text should be modified to maintain consistency of terms. CGTO-33

General Recommendation – The text should either use "Traditional Cultural Resources" or "Traditional American Indian Resources"

4.0 Environmental Consequences - Noise

4.3.1 Proposed Action

Page 4.3-3 Nevada Test and Training Range – The analysis concludes that low-altitude overflights and accompanying noise.

General Comment – The text only evaluates 70% of the F-35 flight activities which does not accurately represent potential noise impacts. Further, there is no consideration or analysis of Indian Reservations and traditional gathering and use areas within the MOA that may potentially impacted from F-35 flight activities. CGTO-34

General Recommendation – The text should be modified to clarify the absence of no analysis of Indian Reservations within the MOA.

4.7 Socioeconomics and Infrastructure

4.7.1 Proposed Action

Page 4.7-1 Population – The text identifies the analysis of population data with corresponding projections associated with the F-35 FDE Program and WS beddown proposal beginning in 2012 and peaking in 2022. The text describes the net increase in personnel for the Nellis AFB.

General Comment – The analysis does not include projected increases in personnel for the NTTR associated with F-35 activities on the NTTR. CGTO-35

General Recommendation – It is recommended that the analysis be expanded to include personnel increases associated with F-35 activities on the NTTR.

Employment and Earnings

Page 4.7-2 Employment – The text uses data associated with personnel support activities at Nellis AFB.

General Comment – The data appears to be limited to Nellis AFB and does not evaluate any anticipated changes for personnel associated with F-35 activities on the NTTR or within the MOA.

CGTO-36

General Recommendation - The data should be expanded to include military and civilian personnel associated with F-35 activities on both the NAFB and NTTR.

Infrastructure

Page 4.7-2 Housing – Data used in the text is based on information relating to Clark County, Nevada.

General Comment – The data used does not include tribally administered housing programs within Clark County or other tribal communities within the MOA.

CGTO-37

General Recommendation – The text should be expanded to include housing data for tribal communities within the MOA.

Page 4.7-3 Public Schools - Data used in the text is based on information relating to Clark County, Nevada.

General Comment – The data used does not include information specific to tribal communities including a tribally operated school administered in Nye County, Nevada. CGTO-38

General Recommendation – The text should be expanded to include School data for tribal communities within the MOA.

4.8 Environmental Justice and Protection of Children

Page 4.8-1 Nellis AFB – The text includes and analysis of data relating to noise levels of 5 DNL or greater on affected population using USCB 2005 census zone to calculate the percentage of residential land use under each noise contour.

General Comment – The text does not include those areas located outside the prescribed noise standards and locations identified in the analysis.

General Recommendation – The text should be expanded to include those tribal communities who fall within the definition of Minority and Low-Income Populations, consideration should be given to these communities within the MOA that are not considered in the analysis. CGTO-39

Page 4.11-1 Archaeological Resources – The text acknowledges one eligible National Register of Historic Places site on he base that would be avoided by constructing or demolition activities.

General Comment – The text simply states that the eligible site located on the base would be avoided by construction or demolition activities. Although this action is not intended to include a systematic mitigation plan, the text should be expanded. CGTO-40

General Recommendation – The text should include the intention of developing an appropriate mitigation plan. Further other locations within the MOA that have been identified by tribal representatives associated with the NAFB NAP.

Page 4.11-2 Traditional Cultural Resources – The heading of this section "Traditional Cultural Resources" describes the absence of known "Traditional Cultural Properties."

Further, the text is limited to Nellis AFB and indicates that there are no traditional cultural properties known on NAFB; therefore, impacts to this resource are unlikely. It is further noted that no concerns have been elicited by American Indian groups relating to the adverse impacts associated with an increase of sonic booms.

General Comment – The heading "Traditional Cultural Resources" is inconsistent with the term "Traditional Cultural Properties" that is contained in the text. Further, the text is limited and excludes the NTTR and MOA that contains traditional cultural resources with many that could be systematically evaluated and nominated under NPS Bulletin 38. Moreover, other known culturally sensitive and/or sacred sites are located within close proximity to Nells AFB. One such example is Gypsum Cave that has not been evaluated or considered in the analysis. Clearly, increased activity related to the F-35 FDE and Weapons School Beddown could adversely impact these significant areas. Lastly, no systematic studies or analysis of adverse impacts from F-35 related activities including increased sonic booms within the NTTE MOA have not been entertained or supported by the NAFB.

General Recommendation – Further analysis should be conducted and an acknowledgement of these areas and a disclaimer should be included within the text to alleviate confusion. Further, provisions should be made to allow tribal representatives to observe the impacts of sonic booms to important traditional use and/or traditional cultural resources. CGTO-41

5.0 Cumulative Effects and Irreversible and Irretrievable Commitment of Resources

Page 5-5 Department of Interior Past, Present and Future Actions – The text describes an overview of the Bureau of Land Management and the U.S. Fish and Wildlife Service.

General Comment – The text does not include the Bureau of Indian Affairs or tribal lands under the responsibility of the Department of Interior and/or Tribal Governments within Clark County, NV or the MOA.

CGTO-42

General Recommendation – The text should be expanded to include the Bureau of Indian Affairs and tribal lands under the authority of tribal governments.

5.2 Assessment of Cumulative Effects by Resource Area

Page 5-6 (Introductory Statement) – The text indicates that when cumulatively with past, present and/or future actions, resulted in a finding of no adverse and/or significant impacts to noise; land use and recreation; socioeconomics and infrastructure; environmental justice and protection of children; biological resources; and hazardous materials and waste.

General Comment – The introductory statement concludes and assumes that no adverse and/or significant impacts without considering the information and/or comments presented by the DRC.

General Recommendation – It is recommended that the information presented by the DRC be considered prior to making any foregone conclusions. Secondly, the text should be modified so as not to present a finding of no adverse and or significant impact until all information is systematically evaluated.

CGTO-43

Page 5-6 Noise – The text concludes that there will be no adverse or significant impacts associated with noise related to the F-35 FDE/WSB.

General Comment – Several Tribal communities are located near or within the NTTR MOA and may encounter adverse impacts associated with increase sonic booms during military operations.

General Recommendation –The text should be modified so as not to give the appearance that no effects will be encountered by tribal communities that are located near or within the NTTR MOA. CGTO-44

Page 5-6 Socioecomics and Infrastructure – The text indicates that the F-35 FDE/ WSB will not adversely impact the Las Vegas urban areas.

General Comment – The F-35 FDE/WSB facilities will impact the areas as proposed however military activities and military operations will occur on the NTTR. As such, the analysis should consider all tribal communities within the MOA and beyond the Las Vegas urban area. Several Indian Tribes near or within the MOA have extensive economic development plans for the development of tribal enterprises and operations. CGTO-45

General Recommendation – The text should be modified to indicate additional analysis of impacts to tribal communities and enterprises.

Page 5-7 Environmental Justice and Protection of Children – The text indicates that no incremental impacts are anticipated around the Nellis AFB and the NTTR airspace.

General Comment – The text indicates assumes that no impacts are anticipated however no analysis is provided for evaluating tribal communities and moreover access limitations and holyland violations. CGTO-46

General Recommendation – The text should be modified to include a statement that prior to determining no incremental impacts an analysis will be conducted of tribal communities.

Appendix C

Page C-21 (2.0) Noise Effects on Historical and Archaeological Sites - The text indicates and attempts to extrapolate noise data relating to a restored plantation house built in 1795 and situated 1500 feet from the Centerline at the departure end of Runway 19L at Washington Dulles International Airport to delicate petroglyphs, pictographs, rock cairns and other sacred and/or ceremonial areas with in the NAFB MOA. CGTO-47

General Comment: The text is misleading and should be corrected to identify the inherent limitations of the Noise Effects and Modeling used to identify potential adverse effects.

SUMMARY REMARKS

The DRC has thoroughly evaluated the Draft F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement developed for the United States Air Force – Air Combat Command. The report appears to describe the proposed action with corresponding tables and appendices. While the DRC does not support the destruction of important resources it recognizes that the purpose of this Environmental Impact Statement is required under the National Environmental Policy Act and supports the mission of the Nellis Air Force Base and the Nevada Test and Training Range.

The DRC has identified forty four (44) comments and six (6) recommendations to further enhance the Draft F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement prior to finalizing the report described in this document. The document described in this review is considered necessary for military operations. Using the criteria established the DRC; the committee was afforded the opportunity to collectively and systematically evaluate the document. Lastly, as a consortium of tribes, the CGTO has worked collaboratively with the NAFB since 1996 to effectively co-manage the resources on the Nellis Air Force Base and the Nevada Test and Training Range.

RECOMMENDATIONS

1. The DRC recommends that more collaboration be initiated between all federal agencies having responsibility to manage lands under their jurisdiction and that have a trust responsibility to work directly with culturally affiliated tribal governments.

2. The DRC recommends that the Consolidated Group of Tribes and Organizations accept the basis of this report with the understanding that the results of the DRC's findings be incorporated into a final report.

3. The DRC recommends that the Draft F-35 Force Development Evaluation and Weapons School Beddown Environmental Impact Statement developed for the United States Air Force Air Combat Command be revised to include those recommendations and/or suggestions identified by the DRC prior to being finalized and accepted.

4. The DRC recommends that systematic studies be conducted to evaluate the impacts of sonic booms to culturally sensitive areas be conducted to ascertain data for future military activities.

5. The DRC commends the NAFB for recognizing the importance of incorporating systematic reviews of proposed actions and continues to recommend that all future efforts be coordinated through Richard Arnold, CGTO Spokesperson and Program Coordinator.

6. The DRC recommends that review of this report does not diminish the need for continued consultation and evaluation of areas of importance to Native Americans that may occur in or near the proposed project area described in this report.

7. The DRC recommends that all documents describing and/or having possible cultural implications continue to be systematically evaluated by the DRC.

ATTACHMENT B

Responses

Response to Comments

Comment/ Letter #	Response #	Response
0001	P-1	Official notification of the F-35 FDE WS draft EIS public comment period began with publication of the Notice of Availability on April 4, 2008 in the *Federal Register*. Advertisements were placed in the *Las Vegas Review Journal/Sun Times*, *Lincoln County Record*, and *Pahrump Valley Times* providing times, dates, and locations of the meetings, two weeks prior to the first meeting. The Alamo public hearing was held on April 28, 2008 at the Lincoln County Annex.
0002	P-2	Discussion of zoning and land use relative to the F-35 Beddown can be found in Sections 3.6 and 4.6, Land Use.
0003	P-3	Caliente and areas to its north underlie the Desert MOA. This airspace has been used for military training since the 1950s. During the 1990s, airspace use in the area averaged approximately 13,000 sortie-operations, including supersonic flight, per year. In 1999, these same noise and overflight conditions would have applied.
0003	P-4	The Air Force considers each damage claim on a case-by-case basis. Air Force regulations provide an established process through which damage claims can be submitted, investigated, and resolved.
0003	P-5	The floor of the MOA is, indeed, 100 feet AGL in the portion of the MOA you describe. This altitude authorization has been in place since well before 1999. Please note also that a supersonic waiver is in place for the MOA, allowing supersonic flight operatioins down to 5,000 feet AGL. However, as described on page 3-7 of the EIS, all pilots operating in the airspace must adhere to FAA rules that require all aircraft to avoid persons, vehicles, and structures by 500 feet. The minimum altitude for supersonic flight in this area is 30,000 feet MSL, or about 25,000 feet AGL. Since the overlying airspace is used for supersonic flight, sonic booms in the area do occur as described in Sections 3.3 and 4.3 of the EIS. With the beddown of the F-35, the area under discussion near Caliente would likely experience 1 additional sonic boom per month as discussed in the EIS.
0003	P-6	Combat training may require a pilot to make aggressive maneuvers at low altitude. This may be misinterpreted as an attempt to harass livestock on the ground, however, it is the pilot executing combat training maneuvers designed to help the pilot survive engagements with enemy weapon systems. However, purposely harassing livestock is not acceptable. Whenever a citizen notes an aircrew breaking flight rules, the Air Force encourages you to note your location, exact time, and nature of the incident and report it to the Nellis AFB Public Affairs Office.
0003	P-7	All responses to comments are presented herein, in accordance with NEPA and CEQ regulations.

Comment/ Letter #	Response #	Response
0004	A-1	If the proposal were to become a reality, the Air Force would update its current AICUZ Report to reflect the F-35 beddown and after the aircraft have "settled into" their flight profiles. Until that time, the current EIS contours will be used as interim AICUZ contours. Nellis AFB would continue to work closely with Clark County.
0005	A-2	The EIS thoroughly analyzed the potential for disproportionate adverse impacts on minority and low-income populations. As presented in Section 4.8, the percentage of minority populations affected by noise levels of 65 dB DNL and greater would decrease from 74 to 73 percent. Low-income populations affected would decrease from 18 to 16 percent. The existing distribution of minority and low-income populations in the census block areas surrounding Nellis AFB already exceed county averages of 38 and 12 percent, respectively. Also, growth in the affect minority populations occurred since 2000 even though the noise contours did not change.
0005	A-3	The Air Force, specifically Nellis AFB, has worked with and continues to work with governments and communities surrounding the base. Over the years, Nellis AFB has addressed the encroachment by these communities through implementing noise abatement procedures listed on page 3-22. In addition, as described on pages 3-18, Nellis AFB has consistently used the AICUZ program to provide public involvement on noise issues, information on noise attenuation to the public and local governments, and information on soundproofing and other mitigation measures. As described in Sections 3.6 and 4.6, Land Use, increases in housing, population, and sensitive receptors affected by aircraft noise derive primarily from encroachment outside the control of Nellis AFB and contrary to recommendations made by the Air Force's AICUZ studies.
0005	A-4	The recreation areas under the MOAs are administered by state and federal agencies, not the Air Force. The Air Force and Nellis AFB regularly consult and coordinate with these agencies on numerous issues, and use those efforts as a means of informing the public. In addition, Nellis AFB Public Affairs provides the opportunity for members of the public to contact the base to air issuesabout noise. Since the agencies that administer these lands (e.g., BLM) have not noted any problems with lack of information to the public about these issues, no additional public outreach is contemplated by the Air Force at this time.
0005	A-5	The Air Force is a leader in Environmental Management and committed to elimination or reduction of waste, including the practices mandated in E.O. 13148. All such practices will be, as feasible, incorporated into the design, construction, and operation of facilities.

Comment/ Letter #	Response #	Response
0006	A-6	The Air Force is committed to continuing to work with the City of North Las Vegas and other municipalities to limit the effects of aircraft noise resulting from the beddown. As new information is developed, and system related issues are learned, better planning and noise information will be used to improve noise management at and around the base.
0006	A-7	The figure referenced in the comment depicts overall Clark County noise environ contours used specifically for land use and zoning. This information is derived directly from Clark County and is used for consistency across all affected communities. For comparability purposes, the EIS used this standardized land use information. The EIS, in Sections 3.6 and 4.6, were amended to recognize the issue of growth raised by North Las Vegas. In addition, the EIS notes the variation of land use planning between Clark County and the City of North Las Vegas.
0006	A-8	The analysis was updated to reflect the data available from the 2010 U.S. Census. This source is used to ensure consistency across the various locations and to support the evaluations in Socioeconomics as well as the Environmental Justice sections.
0006	A-9	Nellis AFB works closely with Clark County and adjacent communities through its active Air Installation Compatible Use Zone program. Refer to page 3-18 for discussion of this program.
0006	A-10	The EIS thoroughly examines air quality emissions potentially resulting from the beddown in Section 4.4.1. See especially discussion following Table 4.4-2 and the consultation undertaken with Clark County's Department of Air Quality and Environmental Management. Appendix F also provides detail on the conformity applicability analysis for this proposal. The emissions would remain in conformity with all applicable laws, regulations, and plans. No sensitive species would be adversely affected based on the analysis presented in the EIS, please refer to Section 4.10.1.
0007	A-11	Thank you for the comment.
0008	A-12	Since receipt of this comment, the County has submitted its Ozone Redesignation and Maintenance Plan to USEPA. Discussion on this topic was revised to reflect the current status. It can be found on pages 4-19 and 4-20.
0008	A-13	This information was incorporated into the EIS in Section 2.4.2 on pg. 2-37.
0008	A-14	The EIS was revised to indicate that the Grand Canyon lies 97 km from Nellis AFB and this condition was evaluated in Section 3.4.1, page 3-39.
0009	A-15	Thank you for the comment; evaluation of the potential effects to cultural and traditional resources are found in Section 4.11.1.
0010	CGTO-1	Recognition of the CGTO was added to Section 7.0—Persons and Agencies Contacted.

Comment/ Letter #	Response #	Response
0010	CGTO-2	The recommendation was taken and further clarification of the CGTO and DRC was inserted on page 3-91 of the EIS. Information on public involvement and opportunities for meeting over the multi-year process was addressed in Section 2.4.3 of the EIS.
0010	CGTO-3	Thank you for the comment. Nellis AFB undertakes this government-to-government relationship through its active Native American Program, as referenced at page 3-94.
0010	CGTO-4	Criteria for selecting schools for study included assessed distances from NTTR. This includes the Duckwater, Timbisha, and Moapa schools. The Las Vegas Paiute School is in a noise environment well below the 65 dB DNL threshold for analysis. Similarly, the Duckwater, Timbisha and Moapa schools are far enough away as to not be affected by subsonic or supersonic noise originating from NTTR.
0010	CGTO-5	The term Traditional Cultural Resources was changed to Traditional Cultural Properties (TCP) in the final EIS. Since 1997, Nellis AFB has been in the process of utilizing professional archaeologists and Native Americans to systematically characterize the seven mountain ranges on NTTR. Any TCP designation will be a combined effort between Nellis AFB and the tribes. Nellis AFB and Native Americans are currently characterizing the fifth mountain range.
0010	CGTO-6	The Air Force has encouraged bases to initiate a variety of studies to assess impacts to cultural properties. A study was conducted as part of investigations in Civet Cat Canyon on the NTTR at a large rock art site and historic ranching complex, and a rock art locality in an overflight zone. Native Americans were participants on the field crew and the document was reviewed by the DRC. The research team did not obtain any evidence of impacts from noise. Nellis AFB continues to encourage the tribes to assist in initiating studies in other zones.
0010	CGTO-7	The noise section addresses health affects for all people. Specific issues about how noise is perceived for special use areas (e.g., sacred areas, wilderness areas, critical habitat, etc) are discussed under land use, Section 4.6.1, starting on page 4-29.
0010	CGTO-8	Cultural and perception impacts are relative to the populace affected by the action. In this case the Air Force used standard Air Force noise programs to model F-35 sound levels; these include evaluation of the generally accepted notion of annoyance. It should be noted that all F-35 activities on the NTTR occur in areas already overflown by numerous aircraft and the sonic booms and noise impacts are only increased slightly for all receptors under the NTTR. Near the airfield, school parks and other culturally sensitive areas have been analyzed.
0010	CGTO-9	Class B, C, and E/HAP categories were defined in the EIS on page 3-43.
0010	CGTO-10	Thank you for the comment. The map in this section was revised to include the location of tribal lands.
0010	CGTO-11	Thank you for the comment. The map in this section was revised to include the location of tribal lands.

Comment/ Letter #	Response #	Response
0010	CGTO-12	Thank you for the comment. The text in the EIS in Section 3.5.1 clearly delineates the differences between BASH and other sources of aircraft mishaps.
0010	CGTO-13	Due to their unexpected nature, the location of the mishaps is unpredictable. The Environmental Management Flight is notified following mishaps. The Nellis AFB Integrated Cultural Resources Management Plan (2006) provides a process for the Cultural Resources Manager to notify the tribes through a five-person committee following an assessment of potential impacts to cultural resources.
0010	CGTO-14	The installation of wind farms relative to their impact to F-35 operations is addressed in the EIS. Proposals involving the locations of windmills should be brought to the attention of the appropriate land manager; generally under NTTR the BLM or the USFS are the land managers where the wind farms are likely to be proposed. In 2005, Nellis AFB concurred with a formal recommendation by the CGTO that any wind farm proposal in which Nellis AFB is a party that the tribes be invited for consultation. Nellis AFB continues to concur.
0010	CGTO-15	No tribal lands fall under the MOAs and therefore are not included in this section. The figure in this section was revised to show the location of tribal lands and their proximity to the airspace.
0010	CGTO-16	Thank you for your comment. The designation of ACECs under NTTR is the purview of the BLM, as the lead agency. Consequently, discussions should be conducted directly with the appropriate BLM district office.
0010	CGTO-17	Nellis AFB maintains its commitment to continue to involve tribes in all federal actions in which Nellis AFB is a party. These areas are currently impacted by aircraft noise and assessments indicate that the proposed action would only negligibly increase noise in these areas.
0010	CGTO-18	Studies indicate that aircraft noise generated by this action would be minor relative to the existing impacts. Determination of tribally designated Wilderness Areas or Wilderness Study Areas is beyond the scope of this document.
0010	CGTO-19	The text was revised to state that only bighorn sheep are hunted in the DNWR for a few weeks in December and in the Stonewall Range for a few weeks in November. No other hunting or recreational activities are allowed on the withdrawn portion of NTTR. Under the MOAs, hunting for big horn sheep, deer, elk, etc. occurs throughout the area.
0010	CGTO-20	The Caliente Framework Plan is no longer referenced in the EIS. However, all current conditions applicable to cultural resources are presented in Section 3.11 and they evaluated for impacts in 4.11.
0010	CGTO-21	The figure in this section was revised to show the location of tribal lands and their proximity to the airspace.
0010	CGTO-22	The text in this section was revised to recognize location of tribal lands and their proximity to the airspace.

Comment/ Letter #	Response #	Response
0010	CGTO-23	Studies indicate that the F-35 would not affect socioeconomics for areas outside of Clark County. The only activity associated with the proposal consists of intermittently flying over areas already exposed to such operations from numerous other aircraft.
0010	CGTO-24	The analysis provided in this EIS analyzes the availability of housing for the influx of personnel attributed to the beddown of the F-35. Since it is unlikely that military or civilian personnel working on the F-35 would move into tribal housing, this topic was not addressed in the document.
0010	CGTO-25	Impact Aid to American Indian Children would not be part of this proposal.
0010	CGTO-26	Thank you for your comment.
0010	CGTO-27	While it is true that the Las Vegas Paiute qualify under the definition of a low-income or minority population relative to environmental justice, the impacts associated with the proposal would not reach the Las Vegas Paiute reservation lands and therefore are not addressed.
0010	CGTO-28	The EIS text limits the discussion of soils and water resources to Nellis AFB because at the NTTR, there would be no ground activities to affect these resources. As such, the condition of soils and water resources would remain similar to current conditions as a result of the beddown and operation of the F-35.
0010	CGTO-29	The Air Force makes the determinations and asks for concurrence from the SHPO. The EIS now indicates eligibility is determined in consultation with the SHPO (Section 3.11) and a concurrence letter from SHPO provided in Appendix A.
0010	CGTO-30	The text was modified on page 3-91 to reflect affiliation of the DRC and the CGTO, and that they review a number of different types of documents.
0010	CGTO-31	The EIS clearly differentiates discussions of Nellis AFB (Section 3.11.1) and NTTR (Section 3.11.2). The quarry site has not been formally determined as a TCP.
0010	CGTO-32	Page 2-39 outlines government-to-government consultation and the public involvement process. As demonstrated in Appendix A, Attachment D, letters were sent to 49 Tribal representatives, including the CTGO, prior to scoping. These letters asked the Tribes for comments and provided the times and locations for all scoping meetings.
0010	CGTO-33	The text in Sections 3.11 and 4.11 was changed to state Traditional Cultural Properties or TCP.
0010	CGTO-34	No tribal lands underlie the MOAs and therefore were not addressed in the EIS.
0010	CGTO-35	Text was added in Section 2.3.2 to clarify that there will be no increase of personnel at NTTR; therefore, this was not addressed in Section 4.7-1.
0010	CGTO-36	No personnel would be added under the MOAs in NTTR. Evaluation of military and civilian personnel was included in the EIS in Section 4.7.1.

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0010	CGTO-37	Section 4.7 evaluates the potential impacts to housing by the incoming personnel. Tribal housing would not be affected or change as a result of this action.
0010	CGTO-38	Section 4.7 evaluates potential impacts to schools by the incoming personnel. Tribal schools or population demand on the tribal schools would not be affected as a result of this action.
0010	CGTO-39	Minority and low-income populations are considered under Environmental Justice, E.O. 12898 (see Section 3.7 for the methodology). Environmental Justice impacts are determined first; then the population is evaluated. Since the tribal communities would not be impacted by the proposal, there was no need for further analyses regarding Environmental Justice.
0010	CGTO-40	A mitigation plan would not be required because the construction would avoid cultural sites on base. No construction occurs under the MOA as a result of this action; therefore, no mitigation measures are needed. As stated in Section 4.11.1, pg. 4-47, if an unanticipated discovery of archaeological materials occurs during construction, then an investigation and evaluation will be conducted according to procedures in 36 CFR Part 60 and the Nellis AFB ICRMP.
0010	CGTO-41	The section was renamed Traditional Cultural Properties. The EIS does include and has included detailed discussion of NTTR and MOA areas under separate header in the same section of 4.11. Gypsum Cave is not on NTTR or under MOA airspace projected for use by the F-35. It is over 40 miles east of the base and would remain unaffected by subsonic or supersonic noise from Air Force operations.
0010	CGTO-42	The impacts associated with the proposed action would not overlap lands administered by BIA, and therefore are not within the affected environment of this EIS.
0010	CGTO-43	The Air Force has considered and evaluated the information provided by the DRC and has concluded the statement in the EIS is still accurate.
0010	CGTO-44	Tribal communities are not located under the identified MOAs, consequently they would not be impacted by the proposed action.
0010	CGTO-45	The economic development of any enterprise, including those by Tribal entities would not be affected by the proposal.
0010	CGTO-46	The proposed action would not affect current policies regarding access to sacred areas.
0010	CGTO-47	Section 4.11.1 details the lack of noise-induced impacts to fragile buildings (including prehistoric adobes) and other resources. The noise appendix (Appendix C, see especially Section C2.0, Noise Effects and C3.0, Noise Modeling) also demonstrates that aircraft noise would not affect rocks or terrain, so it can be anticipated that no impacts to petroglyphs would occur.